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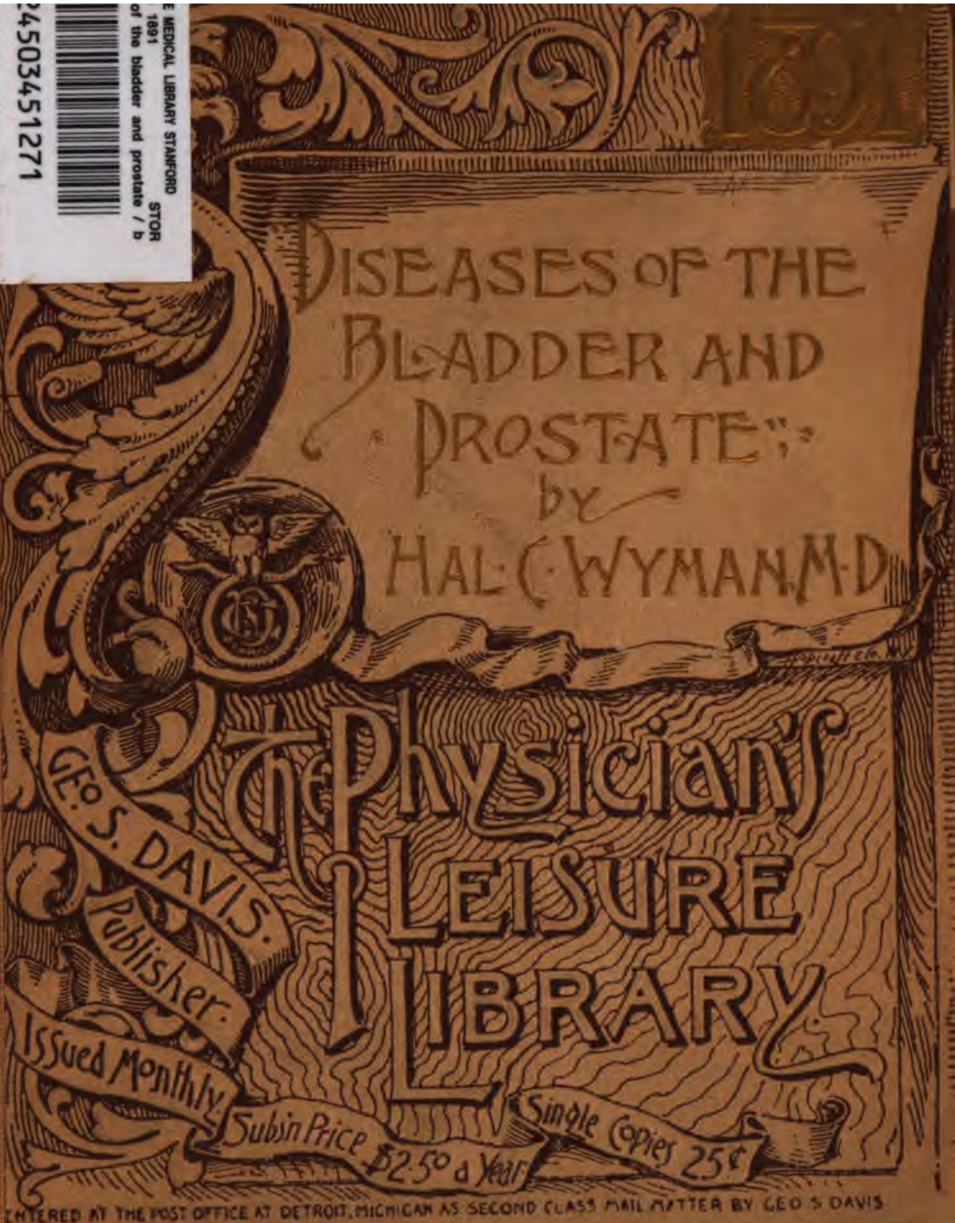

DISEASES OF THE BLADDER AND PROSTATE

by

HAL. C. WYMAN, M.D.

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DISEASES

OF THE

BLADDER AND PROSTATE

— BY —

HAL C. WYMAN, M.Sc., M.D.,

Professor of Surgery in the Michigan College of Medicine and Surgery, Detroit; Member American Medical Association, Michigan State Medical Society, Michigan Surgical and Pathological Society, Detroit Academy of Medicine, Surgeon Detroit Emergency Hospital, Etc., Etc.

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DEDICATION.

To the Alumni of the Michigan College of Medicine and Surgery, who are industriously striving to heal the diseases of their fellow men, this work is respectfully dedicated, as a mark of the esteem in which they are held by the

AUTHOR.

PREFACE.

These pages have been written for the purpose of getting together the best ideas concerning the injuries and diseases of the bladder and prostate, to enable the writer to do better work for the sufferers from a class of very painful and dangerous infirmities. If his fellow practitioners find after reading them any material which will kindle enthusiasm for the same studies, he will feel amply repaid for the time devoted to writing.

DISEASES OF BLADDER AND PROSTATE.

CHAPTER I.

ANATOMY OF THE BLADDER.—HOW TO EXAMINE THE BLADDER AND PROSTATE.

DESCRIPTION OF THE BLADDER.

The bladder is situated in the pelvic cavity where it is protected from external violence by the bony walls of the pelvis. The urine reaches it through the ureters which enter it at the base, one on each side, opening one inch and a quarter apart. The contents of the bladder are discharged through the urethra which opens from the front of its lowest part.

The ureters perforate the wall of the bladder obliquely so that the contents of the bladder are not easily forced back into the ureters. But when the outlet of the bladder—the urethra—is obstructed so that the escape of urine is not easy and natural some of the urine may be forced back into the ureters, dilating them and interfering with the functions of the kidneys. The ureters are controlled at their entrance to the bladder by sphincter action so that a reflux of urine is not to be expected except when that sphincter action is weakened by feebleness of the walls of the bladder. The bladder is an organ of varying capacity, education or training having a great deal to do with the quantity of urine it may hold.

It is composed of three coats which are called its walls. They are: First, its serous or peritoneal coat which does not entirely invest its anterior and inferior walls. Second, its muscular coat which is made of non-striated muscle fibers running in all directions around its cavity. Third, its mucous coat which is a mucous membrane lining every part of its cavity and prolonged into the ureters and urethra.

The serous coat invests all that portion of the bladder which is projected into the cavity of the peritoneum. It is sometimes the seat of localized peritonitis which causes the bladder to adhere to the intestines, ovaries, fallopian tubes, or tumors of the abdominal cavity. Such a peritonitis from its intimate relations with the subjacent muscular coat of the bladder is always characterized by the patient's frequent desire to empty the bladder, and on that account is not infrequently mistaken for a simple inflammation of the mucous coat of the organ.

The muscular coat of the bladder is prolonged to invest a part of the urethra and prostate so that motor energy developed in the one may continue to the others. The arrangement of the muscle fibers is such that when a part is weakened and enfeebled by disease it is apparently thrust aside by the stronger fibers and develops as a sort of hernia of the bladder

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wall. It is then known as a sacculated bladder and may attain a volume corresponding with the unsacculated portion. Sometimes it yields at several points, and the bladder is studded with sacks communicating with the cavity of the bladder because the mucous coat is always pushed into them.

The mucous coat is composed of the different layers peculiar to mucous membrane generally. That part of it directly in contact with the urine is heavily coated with epithelium, and is abundantly supplied with mucus. It is richly supplied with blood vessels which provide the material from which the epithelium is reproduced and the mucus is made. When irritated, it is capable of turning out large quantities of mucus and epithelium, which mingle with the urine and cause the cloudy dense fluid which settles in the bottom of a vessel in which fresh urine is allowed to stand for a few hours. The mucus easily ferments and if it is not normally emptied from the bladder it induces decomposition of the urine.

The blood-vessels of the bladder are derived from the hypogastric and internal pudic arteries, branches of the internal iliac arteries. They penetrate the muscular coat, supplying it with the proper quantum of energy, and are lost in the mucous coat. The veins emerge from the mucous coat through the muscular, and terminate in the hæmorrhoidal veins and portal system.

It is the nervous system of the bladder and prostate which presents the most interesting anatomical and physiological features. The nerves are derived from the hypogastric and sacral plexuses, and through them communicate with the sympathetic and cerebro-spinal systems. An injury to the spinal cord which paralyzes the extremities destroys the contractile power of the bladder; and there is a centre in the spinal cord which may be injured and destroy this power of the bladder without disturbing muscular power in other parts of the body.

The seminal vesicles and ejaculatory ducts are adherent to the bladder, and the latter pass through the prostate. They are involved in the muscular and nervous systems of the bladder in such a way that surgical procedures are apt to be complicated by interference with their functions.

Injury to the seminal vesicles, owing to their relation to the bladder and prostate, not infrequently follow surgical interference with those organs.

The epididimitis and orchitis which are often seen to follow instrumental manipulation of the bladder and prostate, are probably the result of injury done the ejaculatory ducts and seminal vesicles, being conveyed by continuity of tissue along the vas deferens to the epididymus and testicle.

MICTURITION.

The phenomena called micturition are so intimately associated with diseases of the bladder and prostate that some reference to them must be made. The bladder contracts and expels its contents with or without the assistance of the will. The sensory nerves terminating in the mucous membrane recognize slight changes in the quality of the urine, and any foreign substance (pus for example) reaching the bladder with the urine provokes speedy evacuation.

The mind, too, when disturbed by some unusual event, provokes the act of micturition.

Micturition involves two distinct automatic acts, viz., the relaxation of the sphincter muscles at the outlet of the bladder, and the contraction of the muscular coat of the bladder to expel the urine.

Many things outside the bladder and prostate may modify micturition. The condition of the urethra, the kidneys, the skin, in fact anything which concerns the excretion and evacuation of urine, may interfere with normal micturition and change the items which enter into its composition.

HOW TO EXAMINE THE BLADDER AND PROSTATE.

Primarily one may speak of two methods of examining the bladder and prostate gland: the direct and the indirect methods. The former deals with the physical features of the organs; the latter reveals their functions as the patient describes them. They are subjective and objective methods. They must be modified to suit the sex of the patient.

I would conduct an indirect examination of a male, the functions of whose bladder and prostate I wished to ascertain, by submitting the following questions:

1st. What is your age? This answer will reveal the period of life in which males are most liable to certain diseases of either organ. If past middle age I should expect hypertrophy of the prostate, or calculus. If young, like the lover "courting danger at the cannon's mouth," I would suspect inflammatory disease transmitted by continuity of tissue from the urethra.

2d. What is your occupation? A barkeeper would be more liable to venereal disasters to his bladder and prostate than a clergyman or scholar.

3d. How long have you been sick? Is asked to ascertain what inroads the disease has made on his general health and test his powers of endurance.

4th. What previous diseases have you had? Gonorrhœa is quite likely to leave the urethra and prostate disabled.

5th. The location and character of your pain? Pain in the perineum near the anus should always lead one to suspect the prostate. Pain of a crowding down, forcing kind, followed by a dull ache or sharp twinge with a desire to urinate indicates vesical or prostatic tenesmus and points unmistakably to the bladder or prostate.

6th. How often do you pass water? Frequency of micturition may indicate an irritable state of the bladder or prostate. The normal frequency can be ascertained by comparing the present evacuations with those habitual to the patient when well.

7th. The character and quantity of the stream? In prostatitis the urine is sometimes voided in strong jets of short duration. In hypertrophy of the organ it dribbles and slobbers from the urethra. In feeble and dilated bladder the stream is irregular, lacking force.

8th. The color and quality of the urine? The presence of pus or mucus in unusual quantities is an indication of cystitis. The presence of blood is significant of solutions of continuity in some part of the urinary tract, generally the bladder or prostate. In rupture and gunshot wounds it is one of the most important guides to diagnosis. And it is almost an essential sign of vesical calculus. A milky white urine indicates phosphate-uria and an alkaline reaction. A chemical and microscopical examination of the urine according to the most approved methods should be made.

9th. Are you unable to ride or walk with comfort? The presence of stone or foreign bodies in the bladder generally interferes with the facility of these acts; while a chronic venereal disease of the prostate often causes disturbances of locomotion and impaired mobility of joints, which is commonly attributed to rheumatism.

10th. Have any of your ancestors suffered as you suffer? The hereditary tendency to vesical and prostatic diseases is an interesting subject for study. It appears that calculous disease sometimes shows a striking hereditary character. Numbers of instances are recorded of whole families suffering from stone.

After these questions the patient should be laid upon a table for direct examination. The bladder of male or female is situated in the pelvic cavity behind the symphisis pubis resting on the rectum and prostate in the former and the womb and vagina in the latter. When not over-distended it does not rise more than an inch above the pelvic brim. Its presence and degree of distention can be detected by percussion. It will give a dull flat percussion note which is easily contrasted with the tympanitic notes yielded by the intestines on either side of it. But when the womb is in a growing state, so that it rises out of the pelvis, it may so mask the information elicited by percussion that another means of examination must be resorted to.

The hand pressed over the lower part of the abdomen between the umbilicus and pubis will detect the soft fluctuating bladder when the organ rises above the pelvis, but in order to be accurate both hands should be used in a bi-manual examination. In males this is done by inserting two fingers of either hand into the rectum as far as they will go. The hard body felt in front is the prostate and the soft fluctuating tumor above it is the base of the bladder. Then with the opposite hand placed over the apex of the bladder on the abdomen between the pelvis and umbilicus, by pressing the two hands toward each other the bladder will be included between them and its size, shape and relations can be easily felt.

The bi-manual method may be resorted to for the purpose of detecting the presence of tumors, calculi and foreign bodies in either male or female bladder. The patient ought to be anæsthetized if the manipulations are painful or the abdominal muscles irritable and resisting.

The anæsthetic renders the muscles of the abdomen and perineum lax and soft so that one hand can be crowded well down into the pelvis while the other is easily pushed up to oppose it. With practice the *tactus eruditus* may become so refined in carrying on bi-manual explorations that calculi not larger than a bean can be detected in the bladder.

Females when subjected to this kind of examination will yield better results because the base of the bladder will be reached from the vagina and they have no prostate to be excluded from the investigation.

Not long since the writer detected the presence of a papillomatous tumor in the bladder of a young female by the bi-manual method. She had been repeatedly examined for uterine diseases by other physicians, not one of whom thought to make a bi-manual examination of the bladder for the purpose of ascertaining whether the disturbance of her general health was due to vesical disease. After the detection of the tumor the case was readily diagnosed and the treatment based thereon cured the patient.

When the abdomen is tympanitic and the bowels constipated an enema of soap and water ought to be administered before proceeding with a bi-manual examination.

Solutions of four and even higher percentages of cocaine may be used to allay the pain incident to examination either manual or instrumental. It should be applied to the mucous membranes of urethra or vagina by injections or by allowing tampons of absorbent cotton soaked in the solution to remain in contact with the mucosa some minutes before the examination.

Digital and bi-manual examination of the prostate is conducted with one or more fingers in the rectum and counter pressure over the brim of the pelvis with the other hand. The fingers should have their palmar aspect turned to the anterior wall of the rectum through which the prostate will be felt as a firm body which can easily be pressed against the pubic symphisis. When in normal condition it will be felt as a convex body broader from side to side than it is from front to back; and a slight depression or groove will be detected parallel with the urethra and in the median line. This groove marks the location of what some anatomists call the middle lobe and others the isthmus of the prostate. The blending of the posterior border of the prostate with the bladder should be noted by the fingers, and the general mobility of the organ in relation to the bladder and rectum should be carefully ascertained. Where there is much hypertrophy or swelling the mobility of the gland will be impaired. If it is the seat of abscess, fluctuation should be felt by the finger. Inequalities of surface and size of the gland should not escape notice.

The ingenuity of surgeons has been severely tried in the effort to devise instruments for the purpose of revealing the cavity of the bladder and prostate to the eye. But all endoscopes have failed to possess any practical usefulness, and they are but rarely used. To be sure, the inventors have related cases in which they have seen small papilomas in the bladder, but it is doubtful if they could have recognized them before their presence was indicated by bloody urine. Others have described the color and turgid character of the veru montanum and caput gallinaginis and prostatic ducts in cases of spermatorrhœa as seen through the endoscopes, but the information thus obtained has had little practical value as aid to diagnosis or indication for treatment. The instruments which are most useful in an examination of the bladder and prostate are known as catheters and sounds. The former are hollow, to permit the escape of fluid; the latter are generally solid, and are used for purposes of exploration and treatment. These instruments must be passed into the bladder before they can tell us anything about its condition.

That anybody can pass a catheter or sound into the bladder, seems to be assumed by most writers on the surgery of the urinary tract, since few deem it necessary to give any specific directions further than to mention the urethral bulb and the cut-off muscle as points where the passage of the instrument is apt to be obstructed.

The curves possessed by catheters and sounds are adapted to the curve in the male urethra, where it enters and passes through the perineum.

Various materials are used in making these instruments, but when they are used for purposes of exploration they ought to be of hard metal which will not yield to the influence of the perineal muscles and become distorted, so that the operator cannot tell where the point of the instrument is.

The soft and gum catheters should be used only to draw the urine. They are too yielding to be of any service in detecting inequalities of the inner surface of the bladder and prostate. However, the deductions to be drawn from the quantity of urine which they find has been retained in the bladder are most valuable in determining the general condition of the organ. For example, when one passes a soft catheter into the bladder of an old man, whose nights have been made miserable by frequent rising to urinate, and draws off a large quantity of urine which has been retained notwithstanding his frequent micturition, it becomes easy enough to diagnose a weak and dilated bladder, which will soon still further prostrate its owner if prompt measures for its relief are not speedily undertaken. Aside from such use, the soft rubber and gum catheters and sounds are of no value as instruments of precision in the detection of vesical disease. Such instruments, however, may be useful in determining the degree of spasm or obstruction which exists in the prostatic urethra when the prostate is irritable, inflamed or hypertrophied.

To pass a hard instrument is often a matter of extreme difficulty, and a surgical operation fraught with dangers which should never be under-estimated by the operator.

It is a singular fact that a writer in the Surgical History of the War of the Rebellion, in speaking of wounds of the bladder, should say there were no incised wounds of that organ reported except those made by the surgeons. When we think of the cavalry armed with sabers, the officers with swords, and the infantry with bayonets, it is strange, indeed, that the surgeons armed with sharp knives, trocars and catheters should be responsible for all incised and punctured wounds of the urinary bladder. Vidal, in his Treatise on External Pathology and Operative Surgery, says: "*Il y a plus des plaies de la vessicle faites par les chirurgien que des plaies dues aux accidents.*"

Translated, he says there are more wounds of the bladder made by surgeons than by accidents.

It behooves us to exercise great caution when examining the bladder or prostate with a firm, unyielding instrument like a catheter or sound of metal.

Care must be taken not to wound the urethra, along which the instrument must glide before reaching the organs to be examined.

The patient should be laid on a hard bed or table, so that his hips will not sink in and render the perineum and anus inaccessible to the fingers of the operator.

The next step should be the selection of a perfectly smooth and properly curved instrument, which should be thoroughly lubricated with vaseline, lard or sweet oil.

The application of Castile soap and water to the instrument after the oily lubricants, just before the moment of introduction, facilitates the passage.

Then the urethra should be injected with sweet oil or melted lard, care being taken to drive the fluid well down to the prostate and bladder. Now, the point of the instrument should be inserted into the urethral meatus; the handle should be over the abdomen of the patient in such a position that the weight of the instrument causes it to glide along the urethra through the prostate and into the bladder. In making the passage the hand of the operator will describe a semi-circle parallel with the urethral curve in the perineum and pelvis. The point should be guided along the top of the urethra in the gentlest manner possible, and if it meets with obstruction in the pelvis the index finger of the operator's free hand should be passed into the rectum to manipulate the perineum, prostate and neck of the bladder until the instrument is free to continue its journey to the bladder.

Arrival in the bladder is recognized by the freedom with which the point of the sound can be turned to one side or the other. If the catheter is used a free flow of urine indicates that the eye of the instrument has penetrated the cavity of the bladder. But positive knowledge is gained by the fact that, in addition to lateral movements just mentioned, the instrument will move freely straight ahead, independent of its curve, a distance of one or two inches.

To search the bladder, the point of the instrument can be swept in all directions, taking careful note of any inequalities of surface and friction sounds. Rugæ exist at the base of the bladder, and the instrument may be turned so as to produce a dull, grating feeling when gliding over them. If calculi or foreign bodies are present they will be recognized by their mobility and a peculiar tickling and clicking sound emitted from them when struck with the instrument. Tumors will be recognized by the obstruction they cause in the path of movements of the instrument in certain directions. The information to be gained by æsthetized, placed in the lithotomy position, with the buttocks brought well over the edge of the table. With a Sims' speculum, the perineum should be held back so that a good view of the vesico-vaginal septum can be had. Then a short-beaked male sound should be introduced into the bladder, and its point made to protrude the vesico-vaginal septum about one-half inch in front of the cervix uteri and in the median line. On the protrusion an incision is made and carried through the septum until the point of the sound projects into the vagina. Then a blunt bistoury or scissors is passed through the wound, enlarging it anteriorly until within half an inch of the union of the bladder and urethra. Then if the opening is not large enough to permit of the easy eversion of the bladder, a transverse incision of same length should be made at right angles to the first and crossing it in the middle.

After the mucous membrane has been duly inspected and palpated it should be returned to the cavity of the bladder. The wound must then be drawn together with sutures, a catheter *a demure* placed in the urethra and bladder so as to drain away the urine as fast as it appears, until the wound is healed, when it can be removed, the stitches taken out and the patient allowed to resume her customary occupations. In favor of this method of examination it may be said that if one finds anything wrong with the mucous membrane, any tumor for example, it may be removed before the parts are restored to their normal position.

The dangers of instrumental examination are not confined to the difficulties of getting the instruments to pass. Chills, rigors, fever of high degree, not infrequently follow the use of instruments in examinations of the bladder. And death sometimes adds its horrors to the surgeon's work.

Much can be done to avert the dangers by judicious medication. Quinine, whiskey, opium, can be given before instruments are used, and for several hours thereafter, with a reasonable prospect of preventing disorders, results from the mysterious chills and fever known as catheter and urethral fever. I would give quinine in 3 grain doses, once in three hours for 12 hours before making an instrumental examination. Opium 1 or 2 grains may be given by suppository an hour before an examination. Whiskey before the anæsthetic is administered in quantities sufficient to produce a moderate degree of intoxication lessens the dangers from shock. Catheterism is often followed by shock of threatening character. The older writers called the catheter fever reaction after shock.

CHAPTER II.

ON THE PREVENTION OF SHOCK DURING AND AFTER OPERATIONS UPON THE BLADDER AND PROSTATE.—ANÆSTHETICS.

Dr. Stephen Smith, of New York, in a very instructive paper on the subject of shock berates the fact, that notwithstanding our great improvements in the treatment of wounds, mortality due to primary and secondary shock has not diminished. He ascribes this to more prolonged operations, nausea from anæsthetics, and chilling dressings. In pre-anæsthetic days rapidity of operation was the standard of perfection. The tendency now has been to the other extreme and primary shock has diminished, but secondary has increased. The writer emphasizes the dicta laid down by the Americam Medical Association in 1888, viz., "Wait for reaction; calm the patient by a cheerful word; give stimulants before the anæsthetic; make anæsthesia short; operate as rapidly as practicable; dress quickly; avoid chilling the patient." After the operation, apply dry heat, give liquid nourishment with stimulants and laudanum by the rectum; inject brandy subcutaneously; by the mouth give aromatic spirits of ammonia, black coffee and brandy; secure quiet, horizontal position, and sleep; assure the patient that all is over and doing well.

Dr. Smith advises for the purpose of prevention of secondary shock the administration of ounce doses of whiskey in hot milk every hour or two hours as needed, for six or eight hours before the time set for the operation until the patient is in a state of semi-intoxication. In operations upon the prostate and bladder, the gravest secondary shock not infrequently develops. It has been my custom to have my patients who must undergo an ordeal of this kind prepared by the use of stimulants, although I have not practiced their use to the extent urged by Dr. Smith.

It is a wise precaution to give the stimulant with milk always, as it serves the purpose of food as well as stimulant. The hypodermic injection of ⅛ to ¼ of a grain of morphia a few minutes before the administration of the anæsthetic, is sometimes useful as a means of averting shock, but the free exhibition of it after an operation must be practiced with great caution. There is then, I think, danger of the cumulative action of the drug.

ANÆSTHETICS.

Anæsthetics are essential to the safe passage of instruments for detection of disease of either bladder or prostate. A number of different agents are capable of benumbing that portion of the genito-urinary tract involved in the passage of instruments into the bladder. General anæsthesia by chloroform or ether cannot be replaced in all cases by any local anæsthetic at present known. Yet it is a fact that many operations which formerly required general anæsthesia by one or the other of these agents may now be done by the local anæsthesia of cocaine. It is probably the most efficient local anæsthetic known, and may be used in solutions of varying strength. As a rule, a solution of cocaine made of a strength of 18 grains of the muriate of cocaine dissolved in one ounce of pure water is strong enough to produce all the effects which may be desired in the treatment of the ordinary inflammatory diseases of the bladder or prostate.

It should be remembered of this drug that it is not only a local anæsthetic, but that it is also a powerful local hæmostatic. When the height of its anæsthetic properties is achieved, the tissues always have a peculiar pale and bloodless look, due to the local anæmia induced by the drug, and this indicates the principle on which its hæmostatic powers depend.

When cocaine is to be used as an anæsthetic, it is best to use the aqueous rather than the oleaginous solutions, as the former are by far more effective. A syringeful of a four-per-cent. solution (one drachm) should be thrown into the urethra and retained there by the pressure of an elastic band applied near the meatus. Such an application will enable the surgeon to pass the catheter in the most painful cases of prostatic irritability with very little suffering indeed. The principal value to be derived from cocaine in genito-urinary surgery lies in the immunity from shock and the reflex phenomena which follow surgical interference with the complex nervous organization of the neck of the bladder.

But in cases where the genital organs are in a state of erethism, the result of lesions of the bladder or prostate, experience in hundreds of cases shows that it is worse than useless to attempt to accomplish the safe passage of instruments under cocaine anæsthesia. Indeed, I think the drug rather adds to the difficulties. The spasm can in such cases only be overcome by general anæsthesia. One must be mindful of the fact that powerful muscles derived from the levator ani envelope the neck of the bladder, and that when excited they can so alter the relation of the prostate to the bladder that it will be impossible to make a sound or catheter pass without injuring the urethra, unless the beneficent effects of chloroform or ether are invoked to allay the spasm and excitement. In ninety-nine out of a hundred cases of retention of urine due to enlargement of the prostate, doubtless the obstruction to the flow of urine is caused by spasm of the muscles enveloping the prostate, displacing that organ in its relation to the neck of the bladder. The evidence of this is to be found in the suddenness of the attack, in the nervous state of the patient, and the hypertrophied and anteverted prostate.

Injections of a five-per-cent. solution of carbolic acid in warm saline water (sodium chloride ʒ ss, aqua Oij) into the urethra can be used to induce a local numbness and anæsthesia of the urethra, which will often aid very materially the instrumental manipulation of that canal.

CHAPTER III.

DEFORMITIES AND WOUNDS OF THE BLADDER—HERNIA—GUN-SHOT WOUNDS—EXTRA-PERITONEAL WOUNDS—PERITONEAL CYSTOTOMY—VESICO-VAGINAL FISTULÆ.

The bladder is sometimes imperfectly developed. At rare intervals, nature neglects to obliterate that part of the alantois which developed the urachus, and we have a case of umbilical urinary fistula. The channel of the embryo remains patulous, and urine flows from the navel of the child. This deformity may be left to nature to correct when it occurs in early infancy, but when it continues into childhood, if the normal outlet to the bladder *via* the urethra is performing its functions, the edges of the fistula should be pared, excising all protruding mucous membrane, and closed with interrupted sutures. Sometimes large cysts of the urachus develop, which cause the surgeon no small amount of difficulty in removal.

EXTRAVERSION OF THE BLADDER.

Extroversion of the bladder is one of the most melancholy deformities to which humanity is heir. It commonly consists of a total absence of all tissues anterior to the bladder, including the anterior wall of that organ. The symphisis pubis is wanting, the integument of the mons veneris is wanting, and the base and posterior wall of the bladder extrude through the opening in consequence of the intra-abdominal pressure behind them. The orifices of the ureters are clearly visible, and from them the urine may be seen spurting or trickling more or less constantly.

Operations for the relief of this deformity tax the resources of plastic surgery to the utmost. Flaps are generally taken from the abdomen or groin, and turned over the defective region, to the margins of which they are fastened with sutures in such a way as to leave a small channel for the escape of urine.

I have succeeded by making an incision through the integument and superficial fascia about three inches long, about one inch on each side of the pared edges of the defective area. The integument and fascia included between the incisions were directed up, pushed together, and fastened with hair-lip pins and figure-of-8 suture. The exposed raw surface was partially approximated by sutures passed across the wound so as to make a transverse line of union at right angles to the median line of union over the extraversion.

Eversion of the bladder through the urethra of females is sometimes met with. Many curious cases of this kind are described by surgical writers. Its presence implies the existence of a dilated and patulous urethra. It has been observed in young children and adults who have suffered from inflammation of the bladder.

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HERNIA OF THE BLADDER.

The vesico-vaginal fistulas are not infrequently choked by an eversion of the bladder or of its mucous membrane, causing a hernia of the bladder. Hernia of this organ, however, has been observed by several writers who have found it in the femoral and inguinal regions. In the prolapse of the anterior vaginal wall, known as cystocele, there is a displacement of the bladder into the vagina and outside of the vaginal orifice. In cases of complete prolapse of the womb, the bladder is sometimes drawn from its natural position and is flexed so sharply upon the urethra that it cannot readily expel its contents until the patient restores the womb to its normal position, carrying the bladder with it. The cure and relief of these infirmities is practiced by two methods, one of which may be called operative, the other mechanical. By the former method large areas of the vesico-vaginal septum are divested of mucous membrane by careful dissection, and the edges are then brought together and fastened with sutures. The limitation or narrowing of the vaginal canal restores the power of the vaginal walls, and so holds the bladder in its normal position. But when the womb falls through the vaginal orifice and drags the bladder down with it, more vaginal wall needs to be removed, and a part of the womb also, before the bladder can be made to stay in its proper place. The full plastic procedure for the cure of rectocele and cystocele may be required in a case of prolapse of the bladder through the vaginal orifice before a cure can be accomplished.

CYSTOCELE.

Cystocele may exist in varying degrees from a small fluffy projection just below the meatus urinarius choking the vaginal cleft, to the size of a baby's head. The smaller cystoceles are productive of as much irritability of the bladder, frequent micturition and disturbance of general health as the larger ones. I have more than once restored to health patients who were tormented by vesical tenesmus, loss of sleep and mental distress, by an operation for the cure of a small cystocele.

One should be careful to observe that the sensitive condition of the urinary tract following some cases of accouchment serves to draw the attention of the patient to the affected region; slight cystoceles are noticed, and from that moment become sources of mental and physical discomfort until they are removed. No amount of explanation in behalf of the innocent character of small cystoceles will make these patients easy and comfortable.

The mechanical treatment of these infirmities implies the keeping of the bladder and other prolapsed organs in position by means of pessaries. And in some cases they do the work admirably. The best results are obtained with them when they are individualized for each case. Good strong copper wire,

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about the size of a large knitting needle, should be bent in the proper manner to hold up the prolapsed organs. It should then be covered with rubber and is worn by the patient with comfort. Some of the stem and cup pessaries which are held in position by straps around the hips of the patient work admirably.

WOUNDS OF THE BLADDER.

Wounds of the bladder are very serious when they involve that part of the organ covered by peritoneum so that urine escaping through the wound is poured into the cavity of the peritoneum.

A wound of the bladder caused by a gunshot penetrating the abdominal or pelvic cavity is likely to be complicated by injury to other intra-abdominal viscera.

There is but one plan of treatment for such cases and that is the opening of the abdomen in the median line and closure of the wound in the bladder. Wounds in other viscera must also be closed at the same time. The technique of the operation is not difficult. Clean the abdomen with soap and water, bathe it with alcohol or some other antiseptic, cut quickly through the median line between umbilicus and pubis to the peritoneal cavity, hold the wound open with retractors or assistant's fingers (both surgically clean), reach for the bladder and explore its peritoneal surface with the finger until the wound is felt. Then draw the organ into the wound so that sutures may be passed through the peritoneal and muscular coats and hold the peritoneal surfaces together.

The line of union of the two peritoneal surfaces must have sutures enough to make it water-tight. Then wash the peritoneal cavity with tepid water if it has been soiled. See that the urethra is pervious, not plugged with clots of blood, and the bladder wound will heal promptly.

The symptoms of gunshot wound of the bladder are briefly: Track of wound in direction of the organ, bloody urine, marked shock and great pain when the wound includes the peritoneal cavity. It will be necessary to use the cathether when a ball is suspected to have entered or passed through the bladder. If the quantity of urine is smaller than it should be in a sound bladder and tinged with blood, and the patient's face and pulse depict shock, there can be little doubt that there is a wound of the organ.

CASE OF GUN-SHOT WOUND OF THE BLADDER IN WHICH URINE WAS NOT BLOODY AND NO BLOOD CORPUSCLES COULD BE SEEN WITH THE MICROSCOPE.

John C. was shot in a drunken brawl. He was taken at once to the Detroit Emergency Hospital. I saw him there within an hour after he was wounded. He had been given one-fourth of a grain of morphine hypodermatically before I saw him, to relieve the great pain. Notwithstanding the anodyne, he was writhing and twisting with great pain in the lower part of the abdomen when I saw him. A small wound about the size of the end of a lead pencil was found in the abdominal wall, one inch above the symphisis pubis and half an inch to the left of the median line. A probe showed that the ball penetrated the abdominal cavity. The pain indicated that it had entered the bladder as well, for it was much more violent than any I had witnessed after gunshot wounds of the intestines alone.

A soft catheter was passed into the bladder and drew off two ounces of urine, which appeared normal in color.

Thinking it must surely contain blood, I placed at different times several drops of it under the microscope, but failed to find any blood corpuscles. Another anodyne of one-fourth grain of morphine was given hypodermatically. It afforded no relief.

I thought best to make an exploratory laparotomy, being reasonably certain that a wound of the bladder would be found, notwithstanding the urine was drawn with a catheter and was not bloody.

During chloroform anæsthesia the abdomen was opened from the navel to the symphisis. Two wounds one inch apart were found, caused by the ball passing through the fundus of the bladder near its apex.

Two wounds were found in the ileum. These wounds were closed with interrupted sutures after the Lambert method. No other viscera were wounded. The ball left the pelvis through the right obturator foramen. The cavity of the abdomen was washed out with warm water, and closed with interrupted sutures after a drainage tube was introduced and left in the lower angle of the wound.

The patient rapidly grew worse, and died thirty-six hours after the receipt of the wound.

An autopsy showed the bladder and intestinal wounds closed by plastic adhesions, but a quantity of black fluid was present in the abdominal cavity. The ball was found near the outer border of the tuberosity of the right ischium.

EXTRA-PERITONEAL WOUNDS OF THE BLADDER.

Wounds which do not involve the peritoneal investment are to be treated promptly in a way that will prevent extravasation of urine. Extravasation of urine here means escape of urine from the bladder into the connective tissue along the track of the wound. It is recognized by swelling, induration, chills, rise of temperature, and the absence of a normal discharge of urine through natural or artificial channels. When it occurs the extravasated region, *i.e.*, the parts infiltrated, must be freely incised with a sharp bistoury to allow the fluid to escape. To prevent its occurrence is the prime object of treatment of gunshot wounds in the bladder. It is accomplished by securing free drainage of the bladder as fast as urine flows into it from the kidneys. A catheter must be passed and the bladder washed clean of clots. Sometimes the instrument may be left in position to secure thorough drainage. If, however, there is any doubt about the drainage of the wound in this way, as indicated by swelling ecchymosis or infiltration of the perineum, an incision should be made through the

PERINEAL CYSTOTOMY.

perineum into the bladder. This incision is termed perineal cystotomy, and is made as follows: A grooved staff or a sound is passed through the urethra into the bladder. An assistant holds its concavity snuggly up against the pubic arch. The operator introduces his left index finger into the rectum and holds that organ back against the coccyx. In his right hand he holds a bistoury, sharp and straight, which he plunges through the middle line of the perineum, about ¾ of an inch above the anus, until it strikes the grove in the staff. Then the cutting edge is turned to the right so as to run parallel with descending ramus of the pubis and miss the anus as the point of the blade is pushed along the guide into the bladder. No need to think about the prostate when this incision is made. The object is to reach the bladder by a good free incision which will allow the urine to escape without let or hindrance, and a part of the prostate will necessarily be included in the cut. After the knife has reached the bladder it should be withdrawn and the index finger should be introduced in its stead into the bladder for the purpose of further enlarging the wound by dilatation. In women who have suffered a gunshot wound of the pubic aspect of the bladder, a cut should be made through the vesico-vaginal septum for purpose of drainage, if for any reason the urethra cannot be made sufficiently patulous. A catheter is not well tolerated in the bladder of females with gunshot wounds. It provokes distressing contractions—tenesmus which opium or morphine suppositories will not always control. For that reason the making of a wound a half to three-quarters of an inch in length through the middle of the vesico-vaginal septum is to be preferred, as it performs the work of drainage efficiently.

It is done by first introducing a curved sound through the urethra into the bladder. The point of the sound is then turned against the center of the vesico-vaginal septum making it protrude into the vagina. A Sims speculum is introduced into the vagina and the perineum is held back so the operator can see the projecting vesico-vaginal septum. He cuts through on to the point of the sound with a sharp bistoury, penetrating the bladder. A blunt bistoury or scissors are introduced through the wound to enlarge it to the proper size. Through such a wound the bladder is constantly drained. The urine flows into the vagina and it is well to supply that organ with a large perforated glass tube, so curved that it is adapted to the natural curve of the vagina. It will need to be cleaned twice a day, and be well smeared with vaselin or mutton-tallow. I have never had *excoriation* of the vagina or labia from contact with the urine when this method of vaginal drainage has been carried out. The tube ought to be one-half inch in diameter and have a dozen or more perforations of the size of a knitting needle. A rubber tube about four feet long should be attached to the glass tube and conducted to a vessel under the patient's bed.

Gunshot wounds always involve the danger of leaving a foreign body in the injured bladder. Balls, bone fragments, pieces of clothing are liable to be left in the bladder and becoming incrusted with phosphate or lithates from the urine and set up the symptoms of vesical calculi—perhaps long after the original wound of entrance has healed. Therefore, whenever it becomes necessary to drain the wounded bladder by a cystotomy, the organ should be carefully searched for foreign bodies. Some surgeons have indulged in controversy as to the best method of draining the male bladder for gunshot wound, one freely advocating perineal, the other supra-pubic cystotomy. My opinion inclines me to the belief that the character of the original wound should fix the operation. A supra-pubic shot wound might not need perineal cystotomy because the urethra could easily supplement the drainage devised by a supra-pubic cystotomy and *vice versa*.

It is my custom to fix a catheter in the urethra and keep it there for a few days in all cases of supra-pubic section of the bladder. I have never known the presence of the instrument under such circumstances to provoke attacks of vesical tenesmus. In case it had such an effect, it should be removed for fear that the violent contraction of the bladder might cause separation of sutures if any had been used to close a supra-pubic wound of the bladder.

VESICO-VAGINAL FISTULA.

Vesico-vaginal fistulæ are the result of injury to the vesico-vaginal septum, in which the urine escapes from the bladder into the vagina. They are commonly caused by the pressure of the fœtal head during its passage through the pelvic canal. Occasionally they are the result of falls upon sticks, corn stubble, fork handles, etc., which penetrate the thin partition between the bladder and the rectum.

Fistulas between the bladder and rectum, bladder and uterus, bladder and Fallopian tube are among the curios of surgical experience now-a-days, because the causes which induce them are rarely allowed to develop. The bladder is not tapped through the rectum, nor do intra-pelvic inflammations and abscesses go begging for prompt and efficient surgical treatment in this age of civilization.

The cure of vesico-vaginal fistula was for many years one of the surgical impossibilities. Marion Sims discovered and applied the surgical principles on which a cure is based. They may be summarized as follows:

Putting the patient in the knee-chest position; introducing a speculum to hold back the perineum and open the vagina so the fistula may be seen; paring the edges of the fistula by catching it with forceps or tenaculum and cutting away a strip of vaginal mucous membrane running around the fistula; introducing sutures of silver wire or sterilized silk and drawing the pared edges together so as to prevent any urine getting between the edges of the approximated wound; lastly the introduction of a catheter and retaining it in the bladder until union of the wound. This is generally in about one week. In the meantime the patient should be kept quietly in bed and have the bowels moved every day once or twice by keeping them in a fluid state. This can generally be done by feeding the patient corn-meal gruel, and giving her a dose of half a teaspoonful each of calcined magnesia and powdered sulphur twice a day.

Tenesmus of the bladder will once in a while complicate a case, and threaten to tear the wound asunder before it is healed. It is caused by the presence of the catheter in the bladder and urethra. I have best controlled this by taking out the catheter, and having the nurse introduce it and draw off the urine once in two hours. If the patient has a sensitive and irritable urethra it is a good plan to divulse it while she is under anæsthesia for the closure of the fistula. Small fistulæ situated well forward near the origin of the urethra are very troublesome, owing to the tenesmus which follows the introduction of sutures through the muscle fibres of this region. In one instance a cure resulted after two failures, and in consequence of a new fistula which I made in the centre of the septum, and which healed spontaneously soon after the sutures were removed from the wound made to close the primary fistula. It would appear from my experience in this case that keeping the bladder empty—draining off the urine as fast as it flowed into it—was an efficient method of preventing vesical tenesmus.

CHAPTER IV.

RUPTURE AND TUMORS OF THE BLADDER—RUPTURE FROM DISTENSION—EXTRA-PERITONEAL RUPTURE—TUMORS OF THE BLADDER.

Rupture of the bladder may occur in any part of the organ. The rupture through the peritoneum is the most serious.

It is most frequently the result of external violence applied when the bladder is over-distended. Insane persons—paretics—not infrequently go about with distended bladders; then in consequence of falls or rough usage the bladder breaks, and the escaping urine causes the death of the patient in twenty-four or thirty-six hours if prompt surgical relief is not given.

Wise superintendents of asylums for the insane always examine the bladder of newly-arrived patients. The long journey to the asylum, and the ignorance of the patient's companions during the journey, often cause the patient to reach the asylum with a distended bladder. The general frailty of the tissue of persons suffering from general paresis, the impaired innervation, and the fact that such persons have usually suffered from organic diseases of the genito-urinary tract, contribute to make them not infrequent sufferers from rupture of the bladder. The fact of paretics sometimes fancying themselves possessed of remarkable physical strength leads them to attempt unusual feats of physical prowess, and if their bladders happen to be at the time over-distended they easily rupture. I believe this accident to be of sufficient frequency to justify the medical officers in charge of the insane to give its prevention special attention. Robust men and women probably rarely suffer a rupture of the bladder in consequence of muscular action—a spontaneous rupture. It is more than likely that there is present in all such cases a contributing weakness of the bladder walls.

The part of the bladder which most frequently gives way in consequence of spontaneous effort, or kicks and blows upon the abdomen, is said to be near the point where the peritoneum folds from the rectum onto the bladder. But one must not forget that a rupture of the bladder may be either intra- or extra-peritoneal, and that a corresponding great difference exists as to the consequence of the rupture, the intra-peritoneal rupture being more dangerous because less amenable to treatment. Nor are the symptoms alike in the two cases.

When the rupture permits the passage of urine into the peritoneal cavity, the case presents a history of: (*a*) unusual muscular exertion, or violence; (*b*) severe pain in the abdomen, generally in the region of the bladder; (*c*) tympanites; (*d*) rigors; (*e*) small, rapid pulse; (*f*) restlessness; (*g*) facial indications of shock; (*h*) the catheter brings away no urine, or a small quantity tinged with blood; (*i*) inquiry will show (probably) that the patient had not emptied his bladder freely for some hours before the accident. The treatment demands immediate section of the abdomen, search for the rent in the bladder, its closure with sutures, and freeing the peritoneal cavity from blood and urine.

When the rupture is extra-peritoneal, there will be the same history of exertion or violence; there will be pain; the pulse, respiration, and facial expression, will not indicate shock so quickly; there will be no tympanites. The supra-pubic or sub-pubic region will in a few hours begin to swell; there will be ecchymosis of the perineum (probably); the catheter will get bloody urine, and chills and rise of temperature due to urinary infiltration will soon follow. The treatment must involve good drainage of the bladder. This can usually be best secured by perineal cystotomy.

RUPTURE OF THE BLADDER FROM OVER-DISTENSION.

Many surgeons dispute the possibility of rupture of the bladder from over-distension. But nevertheless, that cases resulting from that cause do occur, must be admitted. There is, no doubt, a contributory weakness on the part of the bladder in all the cases. The organ is weakened by softening and thinning of its walls. Ulceration of the mucous coat extends sometimes into the muscular coat, thereby weakening the bladder so that the pressure incident to over-distension causes a rupture. The symptoms of rupture from over-distension are not materially different from those of rupture caused by external violence or muscular action. There is, however, absence of injury in the history of the case.

The treatment must be surgical. The expectant or opium treatment can accomplish nothing. If the rupture extends into the peritoneal cavity, the severe pain in the abdomen which the patient will suffer will be an indication for the performance of abdominal section, and closure of the rent in the bladder. If the laceration is extra-peritoneal it will probably not be recognized so early as when the urine escapes into the peritoneal cavity. The symptoms will develop more slowly. Tenderness and swelling of the perineum and soft parts about the pubis may be the first signs pointing to the rupture. This condition must be treated by prompt and free incision, so that any urine which infiltrates the connective tissue about the bladder may drain away. If the site of the rupture can be determined, the incision should be made to embrace it. The inflammation of the soft parts along the line of incision in these cases is often persistent and destructive, making fistulous tracks through which the urine discharges with more or less constancy. To avoid the development of fistulas, the surgeon should be sure that the urine is drained away by the urethra as fast as it enters the bladder. For this purpose a catheter should be fastened in the bladder; but in case its presence there is not tolerated, instead of fastening it in the bladder it may be introduced at intervals of once in two or three hours.

CASE OF EXTRA-PERITONEAL RUPTURE OF THE BLADDER.

An old man, aged 72 years, got into a broil in a saloon; was kicked and pounded until bruised and bleeding from many wounds about the head and sundry parts of the body. He was brought to the Emergency Hospital, was bathed carefully with a weak antiseptic solution, and had numerous contusions and abrasions dressed antiseptically, but no marks of injury were observed about the perineum of supra-pubic region during the bath. He was put to bed, ate some hot soup, and had a slight chill, during which the temperature did not rise above 100° F. Four hours after admission to the hospital he had another cold seizure, during which he shivered and his teeth chattered. The nurse applied hot-water baths, as his extremities were cold and his pulse weak. His temperature was 103°. After he had been given two doses (20 minutes apart) of 10 drops each of aromatic spts. of ammonia in a half teacupful of strong coffee, he began to warm up and complained of pain about the perineum. An examination showed the perineum swollen and tender, and deeply ecchymosed. The supra-pubic region was also tender and ecchymosed. The soft catheter was introduced and drew away two ounces of bloody urine. He continued to suffer pain in the perineum and behind the symphisis pubis through the night. The house physician used the catheter, which passed easily at intervals of once in three hours, to diminish the risks of infiltration of the regions about the base of the bladder with urine.

The next day there was another chill; the perineum, supra pubic region and scrotum were œdematous, ecchymosed and painful to the touch. The diagnosis was rupture of the bladder extra-peritoneal, with hæmorrhage and extravasation of urine.

The patient was anæsthetized with Squibb's chloroform, was placed in the lithotomy position on a table, a grooved staff, or guide, was slipped along the urethra into the bladder. Then an incision was made after the manner of perineal section for removal of calculus.

The parts divided were firmly packed with coagulated blood and bloody urine. But drainage of the infiltrated parts commenced at once, and the patient continued to improve, and two weeks after the operation left the hospital fully recovered.

TUMORS OF THE BLADDER.

The bladder is not often the seat of morbid growths, and when it is, it is singular that they have rarely been known to extend to the prostate and urethra. An unobstructed state of the prostate is the rule in all cases of tumor of the bladder. The growths which may be looked for are polypi, cysts, papilloma or villous tumors, fibromata, fibromyomata. sarcomata, epitheliomata, encephaloid, scirrhus, and tuberculosis.

They are most frequent in females and occur at all periods of life. Injuries act as exciting causes. I saw a case of villous tumor of the male bladder which was caused by a sinus opening from the hip-joint into the bladder. Malignant growths are the most common new formations affecting the bladder. The papillomas are the most difficult to determine the benign or malignant character of; but a malignant growth infiltrates all the tissues, says Caulson, while a papilloma or villous tumor is limited to the mucous membrane. The symptoms by which tumors of the bladder are commonly recognized are *pain* and *hæmorrhages;* other affections may cause the same symptoms. Calculus, hypertrophy of prostate, and disease of the kidney may give rise to pain and hæmorrhage, and must be excluded before a diagnosis of tumor of bladder can be made. The pain and hæmorrhage may appear suddenly or gradually. In most of the cases the pain and hæmorrhage develop slowly after more or less difficulty in passing water. Pain generally comes first. The patient will complain of severe and progressing pain in the region of the bladder. That organ soon becomes irritable and contracts to expel its irritating contents at very brief intervals, so that there is no rest for the patient day or night. A case which came under my observation some years ago presents such a fair average of the symptoms of tumor of the bladder that I will transcribe it from my case book:

Miss B., aged 21 years, has never consulted a doctor before; she has been through the high school and has enjoyed several seasons of balls and parties. The last one she thinks caused her trouble. She finds herself suffering from dull aching pain in the lower part of the abdomen, a frequent desire to pass water, which on inquiry I learn has lately been seen stained with blood. The pain and desire to urinate are becoming daily more frequent and imperative. Sleep and appetite are disturbed. A catheter of silver is easily passed into the bladder removing a small quantity of urine which is evidently becoming bloody by the presence of the instrument. No tumor or calculus can be felt with it. The finger is introduced per vaginam and a bimanual examination of the bladder made. A tumor about the size of a walnut is detected in the posterior wall of the bladder. The chemical and microscopical examination of the urine reveal no disease of the kidneys, nor can any tumor or enlargement be felt by a careful exploration of the anal regions. The microscope reveals numerous blood corpuscles and the epithelial structure characteristic of villous tumors.

CHAPTER V.

NEURALGIA OF THE BLADDER—PHOSPHATIC DEPOSITS—BLOODY URINE—IRRITABLE BLADDER—CARE IN EVACUATING THE BLADDER — SUPRA-PUBIC PUNCTURE OF THE BLADDER—DRAINING THE BLADDER THROUGH THE RECTUM—SUPPURATION AND TENESMUS OF THE BLADDER.

There are some cases of disturbance of the organs concerned in micturition which show no appreciable lesion after most careful examinations during life, nor do they indicate their presence by any change which can be discovered after death. Surgical writers designate symptoms of this kind when they affect the neck of the bladder, neuralgia. There are numbers of neuroses which affect the bladder, but nearly all of them except neuralgia are merely symptoms of other conditions. Calculi, cystitis, prostatitis, are all associated with more or less pain but the pain can in every instance be accounted for by the physical condition of the organs affected. The causes of neuralgia of the bladder may be very obscure and in some cases undiscoverable; the common cause if carefully interpreted may throw light on the most gloomy cases and suggest a successful plan of treatment.

Neuralgia is due to a lesion in some part of a nerve. Either the nerve cell, the nerve trunk or the end organ of the affected nerve must be the seat of disturbance. A neuralgia of the bladder, then, may result from the presence of an irritant in that part of the brain or spinal cord from which the nerves which supply the bladder have their origin; interference with a nerve trunk on its way from the brain or spinal cord to the bladder; and it may be induced by the presence of something in the bladder which is obnoxious to the ends of the nerves terminating in the walls of that organ. Constitutional causes of neuralgia may be anything which operating through the general system interferes with the functions of nerves. Malaria acting through the blood may impair the nutrition of nerve cells in the brain and spinal cord, and cause a neuralgia of the bladder. It may congest or otherwise interfere with the function of the hypogastric nerves. Bacteria, acrid or unknown chemical substances in the urine may cause neuralgia of the bladder by irritating the end organs of the nerves which supply the muscular and mucous coats.

The greater the skill of the surgeon in the arts of diagnosis the less frequently will he have to deal with cases of pure neuralgia of the bladder. His learning will reveal to him the causes of the pain and his diagnosis will be based on them rather than their symptoms. I do not wish to be understood to mean that neuralgia of the bladder never or even rarely exists. On the contrary, I believe it occurs much oftener than many writers on genito-urinary diseases are disposed to admit. It is of two kinds, generally; one is persistent, continuous for days and nights at a time; the other is intermittent, comes and goes, comes for a day or night, then skips a day and comes again.

The symptoms of the disease are as I have observed them about as follows: Severe pain, paroxysmal in character, located in the base of the bladder. With the pain is often associated a desire to urinate, so that the case is often diagnosed irritable bladder. The location of the pain is not uniform. Sometimes it shoots through the fundus of the bladder and there will be tenderness on pressure over the lower part of the abdomen. I have seen cases which would for a time present the symptoms of myalgia of the abdominal muscles, but later reveal their true character by exhibiting an unusually sensitive condition of the bladder. This sensitiveness is indicated by frequent micturition and usually the urine discharged is colorless and of very low specific gravity. There is also generally a marked inability to endure pressure of the bladder by pressing the hand down over it.

Other cases will commence with pain in the neck of the bladder associated with every effort to empty the organ, but soon the seat of pain is transferred to the urethra or some portion of the penis. It is a well known fact that the irritation of the nerves terminating in the bladder caused by the presence of calculus, frequently is felt with greatest

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intensity at the end of the penis. Often a case of neuralgia of the bladder will exhibit pain in the glans penis of such severity that it suggests vesical calculus as the cause of the disturbance. In those cases I have often found the pain greatly exaggerated when the beak of a sound was swept around the cavity of the bladder searching for a stone, but in no case which I have diagnosed neuralgia have I found calculi or any physical cause for the suffering.

Where the pain comes in rhythmical paroxysms at intervals of 12 or 24 hours, there is generally little difficulty in finding that the patient has been exposed to malarial infection.

Further, the distinct intermission of (12 or 24) hours which comes between the exacerbations are of a kind similar to those observed in cases of ague, so that the diagnosis of neuralgia of the bladder caused by malarial infection is easily made out. When ague was a disease of every day occurrence in the valleys of the Mississippi and the great lakes, neuralgias of the bladder caused by malaria were of common occurrence. They yielded promptly when the patient was treated with two-grain doses of sulphate of quinine every two hours until 20 grains were taken, provided the patient's system had been prepared for the absorption and assimilation of the quinine by taking a good intestinal antiseptic in the form of two grains of chalk mercury once in three hours until copious evacuation from the bowels occurred.

Typhoid and remittent fevers are not infrequently the apparent cause of severe neuralgia of the bladder. Such cases generally develop during or shortly after convalescence. They are due, probably, to a want of proper nutrition of the nerve cells caused by the general impairment of the vitality of the patient resulting from the fever, as exemplified by the case of M. H., a young woman, aged 22 years, who was unconscious for four weeks with typhoid fever. During that time she passed her urine incontinently and the nurse, at the doctor's suggestion, used the catheter once in three hours to prevent the urine from soiling the bed linen and causing bed-sores. The convalescence was unhindered by anything until the patient was enjoying the calls of her friends and an occasional carriage ride. One day, after a ride of a couple of hours, she was attacked suddenly with severe sharp pains in the region of the bladder; with the continuance of the pain there came urgent desire to evacuate the bladder, and the patient soon was compelled to urinate every few minutes. Examination of the bladder by the bi-manual method revealed great tenderness of that organ. Her urine was examined and found to be normal, except that it was of lower specific gravity than usual. There was no apparent disease of the organs adjacent to the bladder. The uterus was not displaced. I could find no cause for the pain in any impaired condition of the mucous membrane or muscular wall of the bladder, and therefore pronounced the case neuralgia.

The remote cause of the attack was, I have no doubt, the altered state of the fluids and tissues of the body due to the ravages of the fever. The impairment of the protoplasm of the cells of that particular part of the nervous system which supplies the bladder and no other, by the ptomaines of the typhoid bacillus is not so easily accounted for. But a discriminating application of the doctrine of *locus minorem resistentia* would probably explain it. The point of least resistance is the place where loss of function commonly has its commencement. It is there that we look for the beginning of the changes which constitute disease. In my case the nerves of the bladder or the cells supplying them with nervous energy may have been the weakest part of my patient's nervous system, and the waste of tissue caused by the long ride, or exposure to cold may have increased the density of the fluids circulating in the deeper organs of the body which resulted in local stasis of the circulation in the nervous apparatus of the bladder, in the same way that the same causes may, operating on another patient, give rise to attacks of facial neuralgia. The treatment of this case was based on the causes already described. The diet was at once changed and she was given food better adapted to her condition. The pain, which was paroxysmal in character was controlled by suppositories of opium and camphor, containing one grain of each of the drugs. These were used once in four hours. She was given iron and quinine in the following proportions:

℞ Quevenne's iron.................. gr. xx.
Sulphate of quinine................ gr. xl.

M. Div. in 20 capsules.
Sig.—Take one once in 3 hours.

The attack lasted three days, during which time there was a return of the pain whenever the use of the suppository was delayed, as sometimes happened when the patient was asleep.

This case merely illustrates one type of the disease.

It is not confined to women. My experience would lead me to think it occurs most frequently in men. It is sometimes very intractable and persists in spite of the most careful treatment.

I have under my care now a gentleman who has suffered with it for more than a year.

He was attacked suddenly at first while carrying his traveling bag from the station to the hotel. With the pain came an urgent desire to urinate. The urine was hot and caused sharp intense pain in the glans penis but did not materially mitigate the pains shooting through the pelvis. After a couple of hours of suffering, he called a physician who told him he had had a stone in his kidney which passing into the bladder had caused the pain there. He administered a hypodermic injection of morphine which controlled the pain and he got apparently well. About a month later he had another attack—caused, he thought, by riding all night on a train on which he could get no sleeping accommodations. This was controlled by morphine. The doctor who was called to this case agreed with the physician who saw him first, and put him on treatment for oxaluria. He took nitro-muriatic acid in 10-drop doses well diluted with water, after each meal, for six months, but attacks of pain recurred at intervals of once in two or three weeks.

Such is the history he gave me when he came under my care. I at once made a careful physical examination of the urinary tract. A No. 12 sound passed easily into the bladder. It revealed no obstruction, nor did it detect any inequalities in the vesical mucous membrane. The urine was examined chemically and microscopically, but disclosed nothing abnormal or unusual. Bi-manual examination, with one finger in the rectum and the hand over the lower abdomen, revealed great tenderness of the bladder behind the prostate. The prostate presented no abnormalities to the touch. Thinking that the rectum might be the seat of a lesion, the pain of which was felt in the bladder and urethra, I stretched the sphincter of the bowel, introduced a duck-bill speculum, and made a thorough examination of the rectum. No abnormalities could be discovered, excepting marked tenderness when the pressure was applied firmly on the side of the bowel next to the bladder and prostate. This tenderness was of a kind which suggested the soreness incident to myalgia, and led me to surmise that the neuralgia might be of a rheumatic type. When the next attack came on I treated him with sodium salicylate in 5-grain doses once in three hours until 120 grains were taken, with the result of relieving the pain and soreness more quickly than it had previously been controlled with morphine. Later the use of sodium salicylate proved of no avail in this case. I have now had him taking iron and cod-liver oil for three months. This has reduced the frequency of the attacks, and will, I think, cure him.

There are many cases of neuralgia of the bladder treated for stricture of the urethra or meatus when narrowing of those channels does not exist. I have seen some men who have been injured by such treatment.

Since the wonderful impetus given to operative surgery by the antiseptic method, many new operations have been devised. The urethra, the bladder, and the prostate, have received their full share of attention from surgeons possessed of the *cacaothes opera.* Neuralgia of the bladder has, I have no doubt, puzzled more than one surgeon with an inventive turn of mind. I am not surprised, therefore, to find not a few recommending slitting the urinary meatus for the relief of pains in the bladder or other parts of the urinary tract which cannot be accounted for by physical lesions which can be detected by existing methods of examination. It may be time to call a halt in the operative treatment of these obscure cases, which are generally neuralgias pure and simple, which should be treated on broad principles having due regard for the nutrition of the whole system. Some one has said that neuralgia is the cry of a hungry nerve. If is often true in cases of neuralgia of the bladder, for improved diet, good digestion and thorough assimilation of food generally cures them.

Neuralgias of the bladder may sometimes require operative treatment. Dilating the urethra of women so that it will admit the finger cures some cases.

Curetting the base of the bladder through the dilated urethra, the patient under an anæsthetic, has cured other women.

Electricity has proved a useful remedy for neuralgia. The continued current with the positive pole in the bladder or rectum and the negative applied by a wet sponge to the perineum or the abdomen over the bladder is probably the best way to use electricity. The interrupted current should not be despised. Any of the common batteries supply this quality of electricity in quantity sufficient for the needs of a case of neuralgia. I succeeded with the Faradic current in the case of a neurasthenic woman whose general health was being improved by taking cod-liver oil and tonics. A positive electrode insulated to the bulbous tip was passed into the bladder, then the negative electrode was applied to the abdomen over the bladder by means of a wire brush. This was used during the paroxysms of pain.

The drugs which I have found useful in controlling the pain are in the order of their usefulness: Opium, morphine, codeia, chlorodyne, hyoscyamus, belladonna, Jamaica dogwood, antipyrin, antifebrin, phenacetin, salol, carbolic acid, salicylate of soda, colchicum, bugle weed, pichi, sweet spirits of nitre, chloral, camphor, bromide of potassium, cubebs, oil of wintergreen, oil of nutmegs. I have seen each of these drugs exhibit an anodyne effect in one case or another. The fluid extract of bugle weed in 20 drop doses has relieved the mild cases oftener than any other drug. Cases in which the cause was located in the nerve centers have yielded to 10 grain doses of antipyrin when opium and morphine proved of no avail.

The marked influence of the coal tar series of drugs in producing carbonæmia and analgesia has led to their liberal use in painful neuroses. They must be used with caution. The frog blooded condition of the human system which their excessive use induces is not favorable to the action of a weakheart.

Oil of wintergreen to be of any use must be given in 10 drop capsules, at intervals of four to six hours. Its virtue may depend upon the salicylic acid it cȏntains; but it sometimes avails to cure when the latter drug has failed.

An excessively acid condition of the urine may require the use of alkalies in the treatment of vesical neuralgias, although in my observation cases of very acid urine have seldom occurred. The urine can be easily rendered alkaline by the use of some salt of potassium or soda derived from a vegetable acid. Potassium or soda salts of vegetable acids, the citrates, acetates, tartrates are oxidized in the system, and are changed into carbonic acid which appears in the urine as carbonate of soda or potash and renders the urine alkaline. Excessive use of bicarbonate of soda I have known to cause one case of vesical neuralgia.

ACID INJECTION FOR PHOSPHATIC DEPOSITS IN THE BLADDER.

Injections of acids capable of dissolving calculi in the human bladder without injury to the bladder, has been one of the dreams of surgery from remote time. Endeavor has been made to find a substance harmless to the walls of the bladder, which would adhere to them and prevent a strong acid from doing damage while it dissolved a phosphatic calculus; but it was futile. The stone was covered and protected as well as the mucous membrane. I have heard of a device to pass into the bladder to open and receive a stone, inclose it in a rubber bag, draw a part of the bag out through the urethra and inject through it a strong acid capable of dissolving the stone.

Such an apparatus may some day be perfected, but at present we cannot inject very strong acids into the bladder without causing disturbances more serious than the disease for which the remedy is proposed. Injections into the bladder of one drachm of

Gaylord
Makers
Syracuse, N.
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dilute nitric acid in one pint of warm water are sometimes used to dissolve the débris of phosphatic calculi after lithotrity. Stronger solutions are not usually well tolerated by the bladder. In some cases of cystitis, when the urine becomes ammoniacal and precipitates masses of dirty white phosphates, an injection into the bladder of two minims of strong nitric acid diluted with one ounce of warm water has been useful. But it is always necessary to use a much weaker injection for two or three days before one of the strength of two minims of the strong acid to the ounce of water is used. A tolerance is by this plan gradually acquired. Generally acid injections are very painful, and it is sometimes necessary to follow them with a hypodermic injection of one-eighth to one-fourth of a grain of morphine.

BLOODY URINE.

The significance of bloody urine is one of the interesting questions in connection with diseases of the bladder and prostate.

Blood in the urine may come from the kidneys, ureters, bladder, prostate, urethra, or seminal ducts. The interesting question to the surgeon is to find from which of these organs it proceeds.

If it is from the kidney or the seminal ducts, its significance is altogether different from what it would be if it came from the bladder or prostate. Blood from the bladder would suggest a stone or a tumor, from the prostate the recent passage of an instrument or the violence of muscular contractions compressing the organ. It has been, and is still for that matter, one of the niceties of surgical and diagnostic art to tell the source of bloody urine. There are several methods for doing it. One is to make a chemical examination of the urine. If the blood is from the kidney it will contain a quantity of albumen indicative of a leak in the glomeruli or tubules of the kidney. Yet it must not be forgotten that a stone in the pelvis of the kidney might cause bloody urine without interfering with the malpighian tufts or the tubules of the kidney. If it is from the pelvis of the kidney, we may find mixed with it the epithelium peculiar to that location, provided we use a microscope to aid us in the differential diagnosis. This instrument readily enables us to distinguish in the urine the epithelium which has sloughed off from the different portions of the urinary tract.

Probably the best of all tests is that derived from a thoughtful interpretation of the conditions under which the urine appears bloody. For example, if the first urine voided contains clot, it is quite likely that the source of the hæmorrhage is to be found in some part of the urethra or prostate. If we draw off the contents of the bladder, and then allow the instrument to remain in the bladder, and find the urine which gradually escapes is bloody, the inference is that it came from the ureters or kidneys. If, however, we find that the urine becomes bloody only after standing a time in the bladder, we may be quite sure that the bladder is the source of the hæmorrhage.

Another method of ascertaining the source of bloody urine is to introduce a soft catheter just within the neck of the bladder, draw off the contained urine, and wash out the cavity with clear water. If the water which thus flows away is bloody, it is from the walls of the bladder. If the water flows away clear, draw it off, and plug the catheter for a few moments, and draw off again. If this urine is bloody, and on washing the bladder the water coming away is clear, the inference is that the blood is from the ureters or kidneys.

Certain parasites lodge in the walls of the bladder and cause bloody urine. In some parts of Africa, hæmorrhage caused by parasites is quite common.

This parasite which usually causes bloody urine is known by the name of *Bilharzia hæmatobia.* Its body is thread-like, about four lines in length. It prefers the walls of the bladder and the portal vein as places of residence. The ova appear under the microscope like watermelon seeds except that they are more candate.

Wyeth treated a case in New York, the patient coming from Africa (where he had had bloody urine off and on for 13 years), with large doses of santonin and injected the bladder with alcohol daily, com-bleeding will [illegible] and increasing it gradually [illegible]

The treatment of bloody urine depends upon the cause which produces it. If there is calculus or tumor, the stone must be removed and the wound must be healed. Rest in bed is essential in most cases. [illegible] by means of an ice bag over the abdomen or to the perineum is a sovereign remedy. Pieces of ice may be used in the rectum. Ergot is given in any case of bloody urine unless there happens to be some contraindication.

The astringents are all useful and should be given in full doses. Citrate of potassium in [illegible] grain doses once in three hours is often used with success. In a persistent case of hemorrhage apparently from the mucous membrane of the bladder in an otherwise vigorous young man I succeeded by cutting down the quantity of water ingested as drink and food. Soups, tea, milk, and coffee were forbidden. He was allowed one ounce of water for every pound of body weight for 24 hours.

If rest in bed, internal medicines, external applications, and restricted diet do not control the bleeding injections of cold or hot water may be made. Astringent medicines may also be injected but all injections should be used with caution and should be sterilized by heating them to the boiling point and then quickly cooling them to the temperature desired. The danger of carrying into the bladder by injections germs capable and likely to set up decomposition of urine and inflammation of the bladder, cannot be overestimated.

IRRITABLE BLADDER.

This term signifies a condition of the bladder in which it is hyper-sensitive and contracts to empty its contents before it is properly filled. The symptoms are: frequent desire to urinate, evacuation of small quantity of urine at each micturition, with more or less disturbance of general health. It may occur at any period of life and should never or at least seldom be considered as a disease *per se*, but as a symptom of some other disease. Men are not more subject to the simpler types than women. Simple nervousness is a common cause of it. A close sympathy exists between the brain and the bladder. It is said that "every mental act in man is accompanied by a contraction of the bladder." It is not unusual for the bladder to become irritable when the lawyer is about to plead a great case, or the surgeon is about to do a great operation.

When there is a lack of brain control and the patient becomes hysterical and nervous, it is not unusual to find the bladder irritable and the patient prostrated and attributing all her discomfort and disease to the irritable bladder. An examination per vaginam in such cases often shows the womb anteverted or anteflexed and apparently pressing upon the bladder. The real trouble, however, is in the nerves and the nervous system must be cured before any sort of local treatment will do the bladder good.

The tonics which have proven most useful in the treatment of this affection when due to lack of nerve control of the bladder, are strychnia, nux vomica, ferrocyanide of iron, cinchona, hops, malt and cod-liver oil. I have found a nervous and hysterical girl who could not control her bladder more than an hour get entirely well after three weeks' use of the following formula:

℞ Ol. morrhua.................... Oss.
Creosoti.......................... grs. v.
M. Sig.—Tablespoonful after each meal.

During the intervals between the meals the patient took:

℞ Ferri ferrocyanas.................. gr. xx.
Strychnia.......................... gr. ss.
Sacch, alba....................... ʒ j.
M. Div. in cht. No. xxx. Sig.—Take one once in two hours in a wineglass of water.

In addition the patient was ordered good cheerful company, open-air exercise, and plenty of plain well-cooked food free from tea, coffee, wine or beer.

ENURESIS.

The irritable bladder least amenable to treatment is that which children sometimes suffer after retiring at night. Enuresis it is sometimes called, and its victims are the recipients of a great deal of abuse. Parents whose children wet the bed rarely know that a faulty condition of the bladder commonly exists in these cases and they will try to break up the habit by whipping the child. In some rare instances whipping may help the patient, but in the majority it cannot fail to do harm by making the patient's nervous system less controllable.

The worst cases of enuresis are those in which the most careful physical examination of bladder and urine does not reveal any organic defects in any part of the genito-urinary tract. The bladder is simply oversensitive and contracts on its contents just as soon as there is enough present to get hold of. By careful training such a patient can be taught to control his bladder during the day, but at night he will soil the bed linen in spite of promises to do better, and the internal use of medicines. Belladonna and nux vomica have a reputation in these cases. They are generally given in combination of a drop each of the tinctures, once in four hours. These agents serve to allay the irritability of the bladder.

The genital organs should be examined and if the prepuce is found adherent, elongated or inflamed, it should be removed. If the rectum is impacted with fæces or contains worms it must be emptied and have its normal vigor restored. The vagina of children is sometimes the seat of catarrhal inflammations which make the bladder irritable, but of prime importance in searching for the cause of an irritability is the fact that it is in almost every case merely the symptom of some other disease which can generally be discovered more easily than it can be relieved.

Two distinct types of irritability of the bladder have presented themselves from time to time, one is characterized by frequent and painful evacuations of small quantities of urine, while the other exhibits the frequent desire, the painful contractions or spasms of the bladder walls, but no flow of urine. A disease of the urethra or prostate is generally at the foundation of these cases. In consequence of strong spasms of the bladder the orifices of the ureters may be obstructed by the growth of the muscular walls of the bladder so that no urine is expelled, all being retained and dilating the ureters and kidneys causing disturbances which generally end in death. In these cases the catheter will get no urine. The treatment should consist of means to allay the spasm of the bladder so that the urine can get out of the ureters and kidney. Suppositories of opium, camphor, belladonna, and hyoscyamus, have been used in the rectum with satisfactory results, but I think they are too slow in their action to be relied upon in such dangerous situations where a few hours of time may mean the subsequent integrity of the kidneys. The hypodermic syringe and warm baths with the cautious administration of chloroform to induce anæsthesia are the remedies to be relied upon in cases of spasm of the bladder in which the hard, contracted organ can be felt pressing against the rectum, and interfering with the flow of urine through the ureters.

The nerves which control the movements of the bladder have two centers, one in the lumbar portion of the spinal cord, the other in the brain, and they are connected by fibers traversing the spinal cord. Medicines must act through one or both of them to control spasm of the bladder, and they must enter the circulation. Hypodermic injection of $\frac{1}{4}$ grain of morphia with $\frac{1}{150}$ of atropine will reach the motor centers quickly. Anæsthetics and baths will act the same way, but they may do their work by inhibiting the motor centers in some reflex manner.

SHALL THE ENTIRE CONTENTS OF THE BLADDER BE EVACUATED AT ONCE?

This question is a more important one than the careless operator might think. When the bladder has been for a long time over-distended by retention of urine, its sudden evacuation by catheter, aspirator or trocar becomes dangerous. It is not so easy to say why suddenly drawing off a quantity of urine which has been causing the patient great discomfort should be a dangerous operation, but it certainly is. Many cases of syncope and death have followed the complete emptying of the bladder under circumstances of protracted retention. Therefore, it is well to never draw off more than a part of the urine at one sitting, and to wait an hour or two before drawing it off the second time; the whole mass can then flow away through the instrument without seriously menacing the life of the patient.

Long-continued distension of the bladder may be suspected in any case of retention of urine due to hypertrophy of the prostate in men of advanced years. It may be suspected in all cases of retention occurring as a result of the presence of a bar at the neck of the bladder.

SUPRA-PUBIC PUNCTURE OF THE BLADDER WITH A TROCAR.

This method of easing the bladder in cases of retention of urine was practiced quite generally in the early part of this century, but owing to the frequency of abscess and infection resulting from it, it was abandoned. But with antiseptic and aseptic methods it may be revived and form a useful ally in the treatment of retention, cystitis and irritable bladder. The operation is performed while the patient is resting on his back. The trocar should be very sharp. The bladder should fluctuate above the pubis. It may be lifted up by distending the rectum, as is done in suprapubic cystotomy. The point of the trocar must be inserted just above the pubis and pushed downward and backward into the bladder. One finger of the operator's left hand may ascend in the rectum for the purpose of exerting counter pressure. After the stilette is withdrawn and the urine has escaped, if it is desirable to leave an opening so that the urine can be constantly drawn off, a piece of soft rubber drainage tubing can be passed through the cannula. The cannula can be withdrawn, leaving the rubber tube to maintain an outlet for urine as it enters the bladder. In this way a SUPRA-PUBIC FISTULA can be established, which may be used as an artificial urethra as long as the cause of retention of urine remains.

DRAINING THE BLADDER THROUGH THE RECTUM.

The bladder may be tapped through the rectum when its cavity cannot be reached by an instrument passed through the urethra, and when for any reason aspiration through the supra-pubic region is not selected. The instrument needed for the purpose is a long curved trocar and cannula. The rectum must be washed out with copious injections of warm soap and water. The operator introduces his finger and feels for the prostate and base of the bladder. With the finger for a guide, he pushes the point of the trocar through the rectum into the bladder just behind the prostate. The stillette is withdrawn, the cannula remains until the urine drains away and the distended bladder is relieved. The opening made by this instrument is so small that it closes and heals before the bladder again becomes over-distended. And, in the majority of cases in which the procedure is resorted to, the bladder returns to its normal action after the operation is performed. But sometimes the causes of over-distension do not vanish so easily. The stricture may be a very hard one, or the prostate may be badly swollen. Then the cannula may be left in the bladder for a number of days. It can be tied in position with tapes.

It has not been a popular operation since the aspirator came into use, but in many cases when drainage of the bladder is desired, as in chronic cystitis, it may be equally as efficacious and much safer than cystotomy by the perineal or supra-pubic methods. I have resorted to this operation with the happiest results to my patients. The danger of doing damage to the parts between the rectum and bladder is very slight. The seminal vesicles can be easily avoided by passing the trocar through the median line. The danger of missing the bladder can be avoided by taking pains to find a distinct fluctuation by striking the bladder above the pubis with one hand while the finger of the other hand feels the base of the organ through the rectum. The point of the trocar must be inserted only when fluctuation is unmistakable. The peritoneum might be punctured and infected if the operator allowed his desire to puncture the site of fluctuation to lead him to introduce the instrument too far away from the prostate. Remember to push it through close behind the prostate in the median line of the region. The peritoneum as it folds off from the rectum into the bladder of males makes a shallow pouch of Douglass, and if the trocar is passed within half an inch of the prostate there is likely to be a whole inch of space between that point and the fold of the peritoneum. The system of antiseptic methods in performing this operation will, I think, serve to restore it to favor which it enjoyed before the days of aspiration. The rectum can now be rendered quite aseptic by use of antiseptic douches and plugging of the bowel above the field of the operation. With a sterilized trocar and washing the bladder with boracic acid solution after it is tapped the minimum of danger of abscess of the parts between the bladder and rectum can be avoided.

SUPPURATION OF THE BLADDER.

Nitrate of silver has been injected in solutions of various strength, ranging from 1 to 20 grains of the pure crystals in an ounce of pure water. Much of the effect of this drug is lost by the precipitation of the silver by the chlorides which adhere to the walls of the bladder when it has not been thoroughly washed with pure water before using the silver. The use of strong injections of this salt of silver in cases of chronic cystitis has been found very useful. These local remedies fail in many cases to do the patient any good. The bladder gets no rest. The patient finds life quite unendurable, but is willing to submit to any plan of treatment which promises to do any good.

The bladder can be drained by a suprapubic or primal cystotomy. The micro-organisms can be attacked more easily with the peroxide of hydrogen and other remedies which could be used imperfectly through the urethra by means of irrigating apparatus.

CHAPTER VI.

LITHOTRITY—LITHOTRIPSY AND CYSTOTOMY—LITHOTOMY—RETENTION OF URINE—OVERFLOW OF URINE—ASPIRATION OF BLADDER—WASHING OUT THE BLADDER—SUPRA-PUBIC CYSTOTOMY.

Lithotrity or the crushing of stone in the bladder has developed into its highly perfected state from the most primitive methods. It was no single jump from the drilling of calculi into small fragments to the crushing and removal of stone at a single sitting.

The method of Bigelow, an American surgeon, is the best. His crusher, evacuator and tubes have stood the test of thorough use, and are a lasting monument to the skill and ingenuity of American surgery. Bigelow's crushing operation can be done without anæsthesia. Cocaine may be used, but better and safer still, is the injection of a 5 per cent. solution, after the method of Dr. Andrews, of carbolic acid to numb the urethra. Fortunately old people with flabby hearts which would not tolerate chloroform or ether well, often have insensitive urethras, and the large tubes of the Bigelow apparatus can be easily used. The prolonged anæsthesia which the operation of crushing entails, leads many surgeons to select the perineal lithotomy for the removal of stone which could be crushed easily enough were it not necessary to use much time and a danger of recurrence of the stone from some fragment remaining behind.

LITHOTRIPSY AND CYSTOTOMY.

Sometimes the pelvis is so deformed in consequence of hip disease or rickets that the space between the descending rami of the pubis is too narrow to admit of the passage of a lithotrite and the large urethral canula for washing away the debris of the crushed stone. In such cases cystotomy is the only alternative; one may select the supra-pubic operation if the route through the perineum is too narrow. But proper ingenuity may enable the surgeon to get some instrument to follow the displaced and probably tortuous urethra to act as a guide or staff along which the bistoury can cut its way into the bladder.

Sir Henry Thompson is greatly in favor of lithotrity. Of 933 adult male cases, operated by him, 800 were by lithotrity, 115 by perineal lithotomy, and 18 by supra-pubic lithotomy. In the adult whose urethra tolerates a large (No. 18) evacuating tube, stones weighing 4 ounces may be crushed. In case of a sensitive urethra admitting only a No. 14, it is better to perform lithotomy.

Thompson's report of 964 cases shows that vesical calculus is not more common in children than adults in England. Classified according to age he had:

Below 16 years	3
16 to 24 years	8
25 to 50 years	89
51 to 70 years	565
Above 70 years	184

Bigelow's method of rapid lithotrity at a single sitting reduced Thompson's mortality more than one-half. His oldest was aged 91. The largest calculus weighed 14 ounces, and was composed of uric acid.

LITHOTOMY.

The operation known as lithotomy is performed for the purpose of removing a stone from the bladder. It is performed in several ways, and each of which has defenders who contend that their way is the best. I shall not describe in detail the different methods, leaving them to be discussed by the more comprehensive surgical writers. There is no more interesting reading than the perusal of the chapters devoted to the history and the methods of lithotomy by the great masters of surgical literature. In all cases the operation should be performed according to the plan which gives *freest* route to the stone, with the best drainage of the bladder after its removal. This is generally lateral lithotomy. It is performed as follows: A grooved staff or guide is first passed into the bladder. It should be as large and the groove as deep as the urethra will admit. It should be given to an assistant to hold up snug under the pubic arch so as to draw the membranous portion of the urethra and prostate as far away from the rectum as possible. The operator cuts the perineum, commencing about one inch in front of the anus at the raphe, and carrying the incision through skin and fascia downward and outward, passing between the anus and ramus of the ischium to a point about one inch beyond the anus. Then he takes a straight bistoury with a blade about three inches long, inserts it at the upper angle of the wound, pushes it straight to the groove in the staff, along which it is pushed into the bladder. A gush of urine announces that the bladder has been reached. The staff is still held in position while the surgeon passes his finger along the wound and dilates the prostatic and vesical portions of it to receive the lithotomy forceps. The staff is then withdrawn and the forceps for grasping the stone introduced. The stone is usually caught without much trouble, but when delay occurs a finger in the rectum and the hand of an assistant over the bladder will dislodge the stone and bring it within reach of the forceps. The delivery of the stone must be accomplished cautiously, the smallest diameter should engage in the wound, and one must not pull too hard or suddenly lest the neck of the bladder be torn and not stretched. When the stone is delivered a search of the wound should be made for bleeding vessels, and any spouting ones must be tied. If there is a copious oozing of venous blood it may be controlled by the shirted catheter.

This is made by taking a large gum catheter, tying a strip of gauze around it about an inch from its tip. It is then inserted though the wound until its tip rests in the bladder; the gauze is stuffed into the wound around it, compressing the bleeding vessels. It is a good plan to douche the bladder and wound with warm saline solution (a handful of salt in a gallon of water) just after the stone is removed. It washes away any blood or clots, or phosphatic deposits or other debris and prevents them from plugging the the wound. A larger catheter should always be left in the wound for a few days. It insures the passage of coagula which otherwise would remain in the bladder to ferment and decompose the urine, which in turn would throw the patient into septic fever and retard the case, if it did not kill him. After a week or ten days a part of the urine will commence to come through the urethra and be discharged naturally, but some will discharge through the wound for a variable length of time. If the patient is eating well and exercising, and the wound continues to discharge, the fluid may be induced to hasten along the natural route by passing a No. 14 sound through the urethra into the bladder once a day. The patient about to suffer lithotomy should be carefully prepared by taking such medicines internally as will raise the fluids and tissues of the body to the highest state of perfection compatible with disease. The digestive ferments, iron, bitter tonics, new food and skilled cooking should be tested to their utmost in this endeavor. The lithotomy position is an essential feature of the operation. It consists in putting the patient on his back on a hard table. The wrists must be strapped to the ankles, and the perineum must be brought well forward over the edge of the table.

The anæsthesia should be profound, so that the surgeon is not disturbed in making the incisions by writhing and twisting of the patient. The local preparation of the patient should be very thorough. The perineum should be shaved. The field of operation should then be washed with soft soap and a solution of corrosive sublimate 1 to 1000; the operator being mindful of the fact that the skin is the most difficult to clean and sterilize of any of the items which enter into a surgical operation. Some one has shown that the streptococcus pyogenes aureus often burrows deep into the epidermis, from which it can be dislodged better by vigorous rubbing with soap and water than by antiseptic chemicals.

RETENTION OF URINE.

The significance of retention of urine is so variable that, as a rule, the first thing the practitioner does who observes it is to relieve it, then he speculates as to its relation to the general health. It matters little what causes it, so far as its influence on the bladder is concerned. The prolonged contact of urine with the mucous membrane of the bladder causes a large quantity of mucus to be secreted and mingled with the urine. In the presence of this mucus the urine ferments, the urea is broken up, and in its stead we have ammonia and carbonic acid. These substances are not well tolerated by the bladder. They stimulate its nerves, and promote muscular contractions–tenesmus. Cystitis,—inflammation of the bladder—is pretty sure to follow an attack of retention of urine if it is not promptly relieved.

Retention may be caused by nervous influences alone, by shock following a severe injury, by the action of drugs,—over-doses of morphine and atropia have been known to cause it—by injuries to the brain or spinal cord, and by spasms of the muscles of the prostate and urethra. Organic obstructions to the flow of urine from the bladder, like a bar at the neck of the bladder from enlargement of the prostate and organic strictures of the urethra. The treatment of the retention of urine requires the immediate evacuation of the bladder. This may be accomplished by the use of medicines or passage of instruments. When the retention is due to a paralysis— loss of nerve power—the catheter is the instrument which should be resorted to, but if its use is neglected the bladder goes on becoming more and more distended until, finally, the sphincter actions of the muscles of the neck of the bladder are overpowered; then we have overflow of urine, which is characterized by occasional discharges of urine.

OVERFLOW OF URINE.

This condition is the natural sequence of retention of urine, and occurs in all cases in which the urethra is not closed so that escape is impossible. But such a closure is impracticable. There will always be a little opening which will permit the fluid to drain away as rapidly as it is excreted.

ASPIRATION OF THE BLADDER.

When there is retention of urine and the surgeon has made careful and cautious efforts to pass a catheter, the patient having been anæsthetized, without the satisfaction of relieving the patient, recourse should be had to the aspirator. This instrument can be used with almost absolute safety. Indeed I sometimes think it safer to aspirate and empty the overdistended bladder than to give the patient an anæsthetic and catheterize him. To aspirate a fine needle sterilized by dipping in boiling water should be thrust through the anterior wall of the abdomen just above the symphisis pubis into the bladder, which will be recognized by the flow of urine along the needle after the aspirating apparatus has been properly adjusted. The object of the aspiration is to empty the bladder with the smallest possible risk. I have never known an accident or any serious result to follow aspiration of the bladder. I have known many cases in which a filiform bougie could not be made to traverse a diseased urethra which, however, readily admitted larger instruments to the bladder a few hours after the aspirator had been used. When I first began aspiration of the bladder for the relief of retention of urine about sixteen years ago I was afraid of peritonitis being caused by a few drops of urine escaping from the wound in the bladder after the aspirator needle had been withdrawn, but numbers of cases and caution in having the instrument clean and passing it through close above the symphisis pubis have led me to regard it as a very safe procedure. I have known patients to go about their work immediately after the operation. But I always advise a few hours' rest in bed after it. I have known patients to have a severe chill and several hours of fever, like the urethral or catheter fever, after submitting to aspirations of the over distended bladder. Notwithstanding the safety of the operation it should not be treated lightly.

WASHING OUT THE BLADDER.

This is done for the purpose of cleaning away the debris after an intra-vesical operation, such as litholapaxy, treating chronic cystitis, or applying medicines to the mucous walls of the bladder. It is a simple operation when properly performed. All that is needed in the way of instruments is a catheter of good size which can be passed through the urethra, a piece of rubber tubing three feet long, large enough to fit over the end of the catheter tightly, and a funnel. The catheter is introduced, the tube with funnel attached is fitted to the catheter. The funnel is raised the length of the tube above the patient's bladder and a half pint of warm water freshly boiled is poured into the bladder through the funnel and connecting tube and catheter. The funnel is held up and the water poured in slowly, so that the hydrostatic pressure causes the fluid to reach every part of the bladder. Then the tube is depressed its length below the bladder and the fluid at once begins to siphon away. With a tube three feet long and one-fourth inch in diameter the siphon stream will have force enough to draw out all clots, pus, mucus and phosphates which may be in the bladder.

There are a number of other devices for the purpose of washing out the bladder. They all possess more or less forcing power. A syringe should never be used for this purpose unless the person using it is aware of the danger of rupturing an old diseased bladder or of paralysing one by over distending it.

The fluid used in these washings should not be cold; it ought to be of a temperature of from 98 to 100° Fahrenheit.

In cases of putrid urine it is well to have boracic acid dissolved in the water with which the washing is done.

SUPRA-PUBIC CYSTOTOMY.

I do not believe it is good surgery to remove a part of the prostate or a fold of hypertrophied mucous membrane of the bladder without opportunities for drainage through the perineum or supra-pubic region. They key to success in all operations on the bladder or prostrate is good drainage.

When the surgeon makes an opening into the bladder above the pubic arch the operation is called supra-pubic cystotomy.

It is reserved for the removal of tumors which cannot be reached through the perineum, for the extraction of calculi and foreign bodies of such size and shape that they cannot be removed by the perineum. Some surgeons would give this operation the preference over perineal cystotomy in all cases, but it is very doubtful if it is entitled to it.

No doubt it is the safer operation in some cases of urethral and prostatic disease in which those organs will not permit the safe use of the lithotrite or the large evacuating tube of the Bigelow apparatus. Chronic nephritis complicating vesical calculus may also justify one in selecting the supra-pubic operation for the removal of the stone. It is an operation which requires the exercise of a high degree of skill in operative surgery. After careful antiseptic preparation of the patient, the pubis must be shaved. Then the bladder should be filled with water. The rectum must be distended with a sponge, or, better still, a large Barnes dilator is passed into the bowel and filled with air or water. Its distension causes the bladder to rise toward the umbilicus, and thereby draws the peritoneum away from the pubis.

The main feature of the supra-pubic incision is to make it without wounding the peritoneum. The distension of the rectum in the manner above indicated makes it possible to reach the bladder without wounding the peritoneum. The incision is made in the linea alba, and commences at a point midway between the umbilicus and symphisis, and is carried downward over the symphisis. The parts beneath are divided and pushed aside until a quantity of fat is reached next to the peritoneum and bladder. Then, with the point of the finger or a blunt forceps, this is separated just as near to the os pubis as possible, and the bladder is found in the bottom of the wound. If a sound can be passed into the bladder by the urethra, its beak can be made to push the anterior wall of the bladder well into the abdominal wound, where it can be incised and have its cavity explored. It is a good plan to pass a needle armed with a long ligature through the wall of the bladder for the purpose of steadying the organ while it is being incised. The ligature used in that way aids in approximating the vesical walls in the operation of suturing them.

TRENDELENBERG'S POSITION IN SUPRA-PUBIC CYSTOTOMY.

This operation has been laden with so many precautions and fanciful dangers that inexperienced surgeons are very apt to look upon it as a very dangerous operation instead of a very simple one. Trendelenburg's position is much talked of in connection with the operation. The purpose of it is to drag the peritoneum and intestines away from the bladder, thereby diminishing the chances of wounding either of those organs while searching for the bladder.

The position consists in placing the patient on his back on a hard table. A pad is then put under the hips, raising them high enough to cause the pelvic contents to slide towards the diaphragm as far as their attachments will allow. The small intestines in this position will slide out of the pelvis and the peritoneum will drag away from the pubis. The bladder will be more easily reached in an operation made above the pubis when this position is held by the patient.

Dr. Stewart, of Pittsburg, has been very successful with his supra-pubic cystotomies. He does not think there is need of the Trendelenberg position, distension of the bladder or a rectal bag. In his operations he has never seen the peritoneum and he has had no serious hæmorrhage or extravasation of urine.

CHAPTER VII.

ACUTE AND CHRONIC CYSTITIS.

ACUTE CYSTITIS.

Inflammation of the bladder is probably one of the most intractable diseases affecting the urinary apparatus. Commonly it is the result of stricture of the urethra, enlargement of the prostate, or pus in the kidney. It is rarely an independent infirmity, but is usually the sequel of derangement of other organs. It is the forerunner of disease of the kidneys and stone in the bladder. It causes the mucus to be poured out in excess and the urine to evolve ammonia, which permeates the ureters to the kidney, when pyelitis and inflammation of the urinary tubules result from the irritating properties of the gas. It is always a serious affliction, and demands the most prompt and thorough measures for its relief.

Acute cystitis differs from the chronic variety in degree. The morbid processes are slower. It is caused by the passage of microbes on filthy instruments used for the purpose of dilating a stricture or passing a prostatic obstruction. It may be caused by infection carried into the bladder with injections used in the treatment of gonorrhœa, and it may result from the chemical and irritating effects of strong medicines used as injections and severe or prolonged instrumentation. Another cause is the acridity of the urine and congestion of the vesical mucous membrane following exposure to cold. In no disease do changes in the functions of the skin more quickly show themselves in an altered state of the urine.

The symptoms of acute cystitis are pain behind the pubis, frequent desire to pass water, with a marked disposition to bear down and continue compressing the bladder after the urine has left it. Fever develops if the case is severe, and the patient has frequent chills with rise of temperature of from two to five degrees. The tongue becomes furred, the appetite is lost, the pulse is small and weak, and the respiration, at first hurried, becomes sighing, consciousness is lost after a few hours of delirium, and coma commonly closes the scene when the case terminates in death. The urine early in the attack, if allowed to stand in a test tube, will appear cloudy and will contain more than the normal quantity of mucus. Pus and epithelium from the mucous membrane of the bladder appear later in the urine. The causes of these phenomena are, first, micro-organic sources of inflammation, and, second, poisoning of the epithelial structure of the bladder and the blood by ptomaïnes, and other products of the action of pathogenic organisms.

Probably the microbic origin of the inflammation is the most fruitful of results in treatment and is the one to study. The bladder like the rectum is exposed to infection by germs on all sides. These pathogenic organisms are said to be constantly present in the urine of both well and sick people. They are constantly present in the air surrounding the patient, and the rectum adjacent to the bladder is a breeding ground for them. In any case when there is an exciting cause for the *locus minoris resistentiæ* in the bladder the danger of infection from the above sources is almost unavoidable.

The treatment of cystitis depends upon its exciting cause. If the prostate is at fault and has caused retention it must be remedied if possible. Other exciting causes, gonorrhœa for example, must be treated at the same time the cystitis is being treated. The first point to be attained is rest for the inflamed bladder. This is accomplished by irritating the bladder as little as possible. Put the patient to bed. Give him diluent drinks. Give him flaxseed or barley tea, or marshmallow or melon seed tea. It is a good plan to have these teas contain 2 grains of citrate of potassium with each ounce. They when combined with the medicine render the urine bland and soothing to the mucous membrane of the bladder. The pain should be controlled by the use of cold external applications and the internal use of anodynes. Suppositories of either opium, morphine, camphor, belladonna, hyoscyamus, or conium have proved very useful when used in the rectum.

Any one of the above drugs is a host in the relief of the pain and tenesmus (bearing down) of cystitis when it is used in proper doses and at proper intervals. The drug should be used in quantity and frequency sufficient to allay the pain, and nothing more. Harm sometimes results from using morphine or opium, or other narcotics, in too large doses. The sensibility of the bladder is obtunded so that it fails to recognize the gradual accumulation of urine within its walls until over-distension causes retention of urine. Such a condition aggravates the cystitis.

The micro-organisms which cause the inflammation must be removed from the bladder if possible, and it is a good plan to take advantage of the influence of cold in arresting their development. The ice bag applied over the perineum or over the lower part of the abdomen where it will come almost in contact with the bladder, has a very beneficial effect in the early stages of cystitis, before the deeper structures of the bladder are infiltrated with pathogenic organisms. I have used ice in the rectum steadily for a week in an obstinate case of cystitis complicated by hypertrophy of the prostate. I have used it in the vagina of women suffering severely from inflammation of the bladder due to retention of urine following an instrumental labor, always with the most flattering and satisfactory results. I have found cold one of the most valuable remedies for controlling the tenesmus of cystitis, and think it deserves to rank next to narcotics as a pain reliever. Its effect on the micro-organisms—arresting their multiplication—also favors their removal from the bladder. Stimulant diuretics, ether, salol, salicylate of soda, cubebs, copaiba, uva ursi, pichi, kavakava, guaiac, arbor vitæ, and many other drugs may be given freely while cold is being used; and while the action of this class of drugs would hardly be thought restful to the bladder, they are useful in sweeping out the bacteria, which, if they remained in the bladder, would soon destroy entirely the usefulness of the organ. They should always be used with abundance of water, for the purpose of insuring a good, thorough flushing of the urinary tract. There is no fixed rule for the treatment of cystitis. Each case must be individualized and treated on its merits. I have seen cases which would not tolerate the flushing process. The diluent drinks seemed to irritate the bladder. Some cases the free use of distilled water (exhaust water from an engine) appears to benefit. There are cases of acrid urine in which the pure-water process is beneficial by holding the irritating particles in solution until they are cast out of the bladder. It should be borne in mind that the majority of all cases of cystitis resulting from gonorrhœal infection or foul instrumentation recover spontaneously in a week or ten days if the patient rests in bed and does not swallow any medicine. The germs will work themselves out if the infected parts are rested by having the patient keep the horizontal position and exercise proper care of the skin. But if the case

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is complicated by the presence of a urethral stricture or an enlarged prostate, the prognosis is correspondingly grave. No amount of treatment addressed to the painful bladder alone will avail anything until after the other organs are attended to.

CHRONIC CYSTITIS.

When the cystitis has become chronic, when the urine contains pus, and the patient is wan and exhausted by frequent evacuations, treatment requires to be more direct than that already described. More searching antiseptics are needed than can be caused to pass through the circulation from the alimentary canal to the bladder. Medicines must be injected into the bladder. Before applying a medicated solution to the bladder the cavity of the organ should be carefully washed out with tepid water. This will bring away quantities of mucus and broken epithelium. It will clean the walls of the bladder so that antiseptics can be used advantageously. Carbolic acid solutions of a strength of 2 to 5 per cent. may then be injected into the bladder, and after being allowed to remain in contact with the inflamed membrane for a brief time, should be withdrawn. This solution is a splendid analgesic for flaccid and suppurating bladder, increasing the flow of urine.

CYSTITIS IN WOMEN.

Cystitis in women is a very intractable disease. The measures commonly used rarely effect a cure.

The artificial vesico-vaginal fistula, advised by Dr. Emmet, insures physiological rest for the inflamed vesical mucous membrane, but patients do not like to submit to it. And the better class of people are rarely subjected to it. With proper vaginal drainage with a large glass perforated tube, I have had no trouble in inducing the most cultured females to enjoy its advantages. Dr. Madden, of Dublin, has devised a plan of treatment for the cystitis of women which does not possess the disadvantage of the Emmet method, and may be equally as effective. The treatment embraces three distinct procedures, viz.: 1st. The internal administration of boric acid by the mouth, to render the urine bland and unirritating. 2d. The dilatation of the urethra with a dilating instrument, so as to paralyze the sphincter of the bladder and urethra; and 3d. The application of a mixture of glycerin and carbolic acid through the dilating instrument to the mucous membrane lining the bladder. Dr. Madden claims that this plan rarely fails to effect a rapid cure when applied once or twice at intervals of a week or ten days. Nitrate of silver solution of the strength of 15 grains to the ounce of distilled water, injected into an inflamed female bladder after the sphincter has been dilated so as to produce an incontinence of urine of three or four days' duration, has cured many cases. But there is always danger of stretching the urethra too much or too little, and where it is overstretched there is danger of the incontinence becoming permanent—a condition more deplorable than the cystitis. Injections of peroxide of hydrogen into the inflamed bladder will cure many cases. In using it, care must be taken to provide for its escape from the bladder. If the urine contains pus, there is no remedy equal to the peroxide of hydrogen for the purpose of destroying the pyogenic microbes. Many cases of cystitis in women are cases of infection from the vagina and vulva. The shortness of the female urethra favors infection of the vesical mucous membrane, with inflammation producing germs. The anther is so short that no catheterism or other instrumentation is needed to carry the germs to the *locus minoris resistentiæ*. Treatment to avail anything must be antiseptic, and its use must not be limited to the bladder. The adjacent cavities must be sterilized by the frequent use of the peroxide of hydrogen, so as to cut off the sources of infection Much of that which is called nervous influence in the cystitis of women is simply infection with micro-organisms, which have the power of exciting cystitis when they reach the bladder. Lacerations and erosions of the cervix must be healed. Endometritis must be cured, and inflammation of the ducts of the vulvo-vaginal glands must be abolished, else the germ will spread along the mucous membrane and reinfect the bladder after it has been sterilized by local and constitutional treatment.

Tampons of absorbent cotton, containing 60 grains of chloride of sodium, placed against the os uteri and changed every 36 hours, in cases of severe cystitis, have aided materially in bringing about a cure. These virtues depend probably on the antiseptic properties of the salt and on the rapidity with which it depletes the local congestions of the structures from which it absorbs water.

CHAPTER VIII.

CALCULI.

Any part of the urinary tract may be the seat of calculi, which are concretions of inorganic substances commonly held in solution by the urine. Some organic substance is usually the nucleus of a calculus. Micro-organisms play an important rôle in the causation of them. They cause the primary neurosis of mucus and epithelium, which forms the nucleus and breaks up the organic constituents of the urine so that the earthy salts are precipitated. Phosphatic calculi are developed in urine which has been made ammoniacal by the decomposition of urea. The decomposition results from the action of a microscopic organism. The presence of pathogenic germs in normal urine is admitted by nearly all investigators, and they are believed to appear in that fluid after passing through the process of elimination. But in the normal condition of the urine these germs do not thrive and multiply so as to become primary causes of disease. The *locus minoris resistentiæ*, which makes the way for the multiplication of micro-organisms, must be caused, and it probably results from trauma, errors of diet, exposure to cold, or one or more of the many things which are capable of interfering with the normal action of the urinary organs.

Irritation, stricture, hypertrophy of prostate, paincysted—partly covered by and adherent to the vesical mucous membrane—than other varieties.

Phosphatic calculi are next in order. They are usually soft and light, of white color. They grow to a great size, conformative to the shape of the bladder. In nearly all cases they originate in the bladder in ammoniacal urine.

Among the rare forms of urinary concretion may be mentioned cystine calculi. They are usually smooth, yellow in color when fresh, and inclining to a greenish hue when long removed, says Wyeth. They have an oily feel to the fingers, and are easily crushed, showing absence of the concentric arrangement seen in nearly all other calculi.

Xanthic calculi are very rare and of marked concentric arrangement, and of color varying from gray to brown.

Carbonate of lime calculi are seldom found. They are chalky in consistence, and exist in numbers in the same bladder. This is the kind of calculus which affected one of the Chief Justices of the United States, from whom the illustrious Dr. Physic of Philadelphia is said to have cut at different operations more than a thousand stones.

SOLVENT TREATMENT OF URINARY CALCULI.

The solvent treatment of stone has long been one of the most interesting studies in medical history. Quackery has had its day with the solution of the stone in the bladder. It is needless for me to explain that the quack nostrums attained their success in cases where no stone existed. The English Government early in the last century paid $25,000 for a recipe which was reputed to be a solvent for stone in the bladder. Chemical examination showed this nostrum to consist of Castile soap, calcined shells, and decoctions of certain well known diuretic herbs. Castile soap and lime-water enjoyed great celebrity in the treatment of calculous disease, but these remedies are seldom if ever employed now.

The first attempt to systematize the solvent treatment of stone was by the French. They determined and announced the kind of stone which was to be dissolved in the bladder by the injection of certain medicines. The uric acid calculi were to be dissolved by the injection of dilute alkalies; the phosphatic by diluted hydrochloric acid; and oxalate of lime by diluted nitric acid. This plan has been modified somewhat to adapt it to the latest views on the treatment of urinary concretions. The alkaline waters of Vichy in France early achieved great success in the treatment of uric acid calculi. Many other springs, in almost every part of the civilized world, have achieved more or less reputation in the treatment of gravel.

The term gravel, used by the laity in a very general way so as to embrace nearly all diseases of the genito-urinary organs, has led to misunderstanding of the real virtues of natural waters as solvents for stone. The layman who, drinking this water, finds himself cured of what he calls gravel, announces at once that he has been cured of vesical calculus. It is quite likely that if all the cases of so-called gravel were searched for stone, and only those allowed to take the waters who possess unmistakable evidence of the existence of stone in the bladder, there would be a great falling off in the reputation of the waters. Quackery of all kinds thrives on the ignorance of its dupes. It has not been a difficult matter to make many persons believe they were suffering from stone when they knew little or nothing of the symptoms of the disease, and it has been easier still to make them think themselves cured of infirmities which they have never had. Much of the success of the preventive and solvent treatment of renal calculi, as it was practiced in former times, was of doubtful reliability. The attempt to dissolve calculi in the bladder by injections of acid or alkaline liquids, well diluted, has been resorted to frequently, and under certain conditions may prove as useful as the administration of medicine by the mouth for the same purpose. It has been, time and again, demonstrated that injections into the bladder of weak alkaline solutions, in case of uric acid stone, or of dilute nitric acid solutions in case of phosphoric concretions, have proved useful in cutting down the size of the stone and diminishing its weight, just as taking by the mouth large doses of acetate or citrate of potash, well diluted with water, will cause the gradual solution of a uric acid calculus. But the impediment to the success and general adoption of the treatment lies in the fact that the stones are commonly so large, when first discovered, that the protracted use of the solvent solutions which would be necessary for their success would do the bladder as much harm as the stone. In like manner, the protracted use of the potassium salts undermines the strength and vitality of the patient while they are, day by day, slowly cutting down the size of a calculus. If we can perfect our art of diagnosis so that we can detect these atoms as soon as they form, while they are yet very small, we can accomplish a great deal by the use of solvent medicines, because their use would not be continued long enough to seriously damage the bladder or the general system.

It has been proposed to remove calculi from the bladder by dissolving them by means of the electric current, but all attempts have been failures, because the strength of current required to break up a stone was too strong to be borne by the bladder. Others have tried to dissolve calculi by means of a solution of nitrate of potassium and electricity. The bladder was to be injected with a solution of nitrate of potassium, this was to be subjected to decomposition by electricity, which would break it up into nitric acid and potassium. The former would dissolve the phosphatic acid, the latter the uric acid and stones. This plan works well outside the human body, but it has been found impossible to make it work in the living subject. Nitro-saccharate and acetate of lead have been tried for the purpose of dissolving the calculi. They induce a double decomposition, it is said. When acetate of lead, in solution, comes in contact with phosphatic calculus, double decomposition ensues, and results in the formation of phosphate of lead and acetate of calcium. Dr. Hoskins, of England, who suggested this remedy, thought it less harmful to the bladder than any of the other plans which had been proposed. As the chlorides in the urine tend to neutralize the strength of the lead acetate solutions by precipitating lead chloride, it becomes necessary, before using it, to wash the bladder and the calculus with abundance of clear water. This may be done by first introducing a double catheter, one tube being for the passage of the fluid into the bladder, the other is for the purpose of letting the water flow out of the organ. Then a solution of acetate of lead, made by dissolving 10 grains of the salt in two ounces of water with 30 drops of acetic acid, may be injected slowly into the bladder and at the same time be allowed to drain away by the return tube of the double catheter. The solution should be warm, and it can be used as often as every 30 minutes without doing harm to the patient.

The lead acetate should be held in an acetic acid solution because it insures perfect solution and prevents the formation of the carbonate of lead. Two drachms of carbonate of soda administered daily for several days has had the effect of breaking up some of the organic calculi and causing their disappearance from the bladder.

Cystic calculi Dr. Roberts found quite soluble in solutions of carbonate of potassium, and he advises full doses of this drug (30 grains) to be taken in pure water—distilled water—four or five times a day.

The use of absolutely pure water, which of course contains no salts, in large quantities may in certain cases act as a solvent for calculi.

Such water appears in the urine very quickly after its ingestion, and it will load itself with any soluble salts which may be available. My experience leads me to think it one of the best remedies for the prevention of calculi.

Borax and phosphate of sodium have been found to possess under certain conditions excellent litholytic properties. They should be given in 10-grain doses in infusion of uva ursi or cubebs once in three or four hours.

Only a few calculi admit of removal by means of medicines taken by the mouth; they are uric acid, and cystine. For the removal of a small uric acid calculus five or six weeks at least must be devoted to the treatment. During all of that time the urine must be kept alkaline, and one effect of the prolonged use of the potassium salts is to lessen the strength and lower the vitality of the patient. The citrates and acetates and carbonates of potassium or sodium ought always to be taken with an infusion or decoction of some of the bitter tonics. I know of none better than those made of wahoo, columbo, gentian or cinchona. Any one of these is an excellent bitter tonic, which is in my judgment essential to use whenever the deposing salts are required.

PREVENTION OF CALCULUS.

Calculus of the bladder is not a sudden manifestation of disease. It is always of slow formation. There must be certain premonitory symptoms which indicate the tendency to calculus, which if properly interpreted can be used to suggest a plan of treatment which will prevent the formation of a stone.

These premonitory symptoms are pain or irritation in some part of the urinary tract and certain changes in the urine. There is usually some aching pain in the loins or lower part of the back, a sensation of heat in the bladder and frequent desire to pass water. The urine will be found on cooling to throw down copious precipitates of urates which should be examined with the microscope. Blood corpuscles along with oxalate of lime crystals, urates and uric acid precipitates can be detected with the microscope long before they exist in numbers sufficient to give to the urine a bloody appearance. If the urates or uric acid, as sometimes happens, precipitate about as quickly as the urine strikes the vessel, it is of serious import, and shows how easily the precipitation might take place in any part of the urinary tract.

Coulson summarizes the treatment for the prevention of calculus under three heads, viz:

1. To diminish the amount of the abnormal constituents in the urine remove the diathesis. This requires a radical change in the diet and habits of the patient, looking after his secretions. The urine has its origin under normal conditions in the digestion of foods and the metamorphosis of tissue. When it is diseased its sources should be thoroughly examined. If uric acid calculus is apprehended animal food must be taken cautiously. Nitrogenous foods must be avoided. A change from the ordinary wheat bread, beefsteak or roast beef, to corn bread, fat pork and molasses often has a salutary effect in breaking up the uric acid diathesis in persons who have not been accustomed to those foods. A purely vegetable diet renders the urine alkaline and uric acid calculus cannot form in it. Alcoholic and malt liquors, coffee, and strong tea should be taken from the bill of fare. Nearly all writers on this subject advise the use of some sort of wine, but in this country the use of alcoholic drinks is not necessary to the nutrition of patients threatened with stone. Plenty of exercise in the open air, walking, riding and rowing are the best exercises for uric acid cases. The functions of

the skin are auxiliary to those of the kidney. If the skin does not act properly the urine becomes acrid and irritating; and changes in its composition, favoring precipitation of the solid, occur. Bathing and rubbing with warm oil, the use of soap, and friction, should be resorted to if the skin is not in the highest degree of activity. The bowels must be active. The internal use of sulphur in 5 grain doses combined in capsule with 2 grains of powdered blood root, once in four hours will commonly promote the activity of the alimentary tract to normal evacuations.

TO PREVENT THE CALCULOUS MATERIAL FROM BEING PRECIPITATED.

Sometimes a long time must elapse before the tendency to the development of calculous material can be stopped. In the meantime the precipitation of the material must be prevented. For this purpose there is no remedy that will prevent the precipitation of uric acid and urates like potassium. The acetates and citrates of potassium are the most useful for this purpose, although liquor potash is to be relied upon where some more powerful oxidizing agent is needed.

It must always be used with great caution. Vichy water may be drunk daily. It is an alkaline water, the base being carbonate of soda. A small amount of alkali with plenty of water may be all that is needed to prevent the precipitation of uric acid or the urates in the form of stone. Tonics, iron and quinine, strychnia, tr. of nux vomica, tonic doses of mercury may be used as adjuvants to the 15 to 30-grain doses of bicarbonate of potassium which should be given three times a day in these cases.

When the oxalate of lime calculus is the one which the surgeon wishes to retain in solution, mineral acids should be commenced at once. Nitro-muriatic acid dilute may be used in 10-drop doses in half a glass of water after each meal. The dose may be increased a drop a day until 20 drops are taken. Lime in so far as practicable should be excluded from the patient's dietary. The waste of time and of food imperfectly assimilated in cases of oxaluria suggests attention to the digestive organs as one of the most certain and useful methods of preventing the formation of mulberry calculi. Rest, change of occupation, of air, of scene, will do good.

If the urine has undergone ammoniacal decomposition as a result of the presence of putrefactive bacteria in the bladder there is grave danger of the formation of phosphatic calculi. That danger may be averted by the use of a catheter and washing the bladder with peroxide of hydrogen twice a day. The well known effect of phenic acid on the bacteria of putrefaction suggests its use in all cases of putrid or ammoniacal urine. Persons suffering from hemi- or paraplegia or any disease which diminishes the sensitiveness of the bladder are especially liable to phosphatic calculi. In such cases catheterization and washing must be practiced to keep the bladder empty. Cases, on the other hand, of spasm and irritability of the bladder in which the urine cannot be long retained are very unlikely to develop calculi simply because the urine does not stay long enough in the bladder to have the precipitation take place.

In all cases of known tendency to the formation of calculi the urine ought to be searched daily with a microscope. A very small stone will, if its owner is jolted about, generally do some damage to the delicate structure where it rests and cause blood to appear in the urine. The quantity may be so slight that the microscope will be required to detect the corpuscles floating in the urine. Before capillaries, however, give way the epithelium is rubbed off by the friction of the stone, and by examining the epithelium one can tell where the calculus is located. The epithelium from the bladder is large, squamous in shape; that from the ureter is conical; while a stone in the pelvis or calices of the kidney will rub off small irregular spheroidal epithelium. The differential diagnosis of stone in the bladder involves the exclusion of urethral stricture and enlargement of the prostate.

The symptoms and signs by which the presence of calculus may be distinguished from the other infirmities just mentioned may be classified as appears in the following arrangement:

STONE IN THE BLADDER.	STRICTURE OF URETHRA.	ENLARGEMENT OF PROSTATE.
Frequent micturition.	Frequent micturition.	Painful micturition.
Pain at end of penis.	Pain about middle of penis.	Pain at neck of bladder.
Pain worse on exertion.	Pain not worse by exertion.	Pain worse when bladder is full and at night.
A few drops of red blood as urination ceases.	No blood.	No blood.
Click of sound on stone.	Use of sound.	Introduce finger into rectum.

The character of the stream in urinating is significant of disease of either the urethra, prostate, or bladder.

STONE IN THE BLADDER.	STRICTURE OF URETHRA.	ENLARGEMENT OF PROSTATE.
Stream may start firm and is suddenly interrupted.	Stream is small, twisted, and sometimes drop by drop.	Diminution of force of stream; generally not noticed until after attack of retention.
Changing position starts stream again.		Peculiar hesitation and uncertainty about starting stream which drops off the end of urethra without force.

VESICAL CALCULUS IN THE FEMALE.

Calculi in the female bladder can generally be removed by dilating the urethra and pulling them through it with a forceps. I have succeeded in this way in removing a calculus, which measured one inch and three-quarters of an inch in its shortest diameters, from the female bladder. The patient suffered incontinence of urine not more than two days after the operation. If the stone is larger than in the case just mentioned I advise crushing it with the forceps or lithotrite and then carefully removing the fragments per urethram. With one finger in the vagina the stone can easily be held between the jaws of a crushing instrument until it is properly broken up. In the operation it is well to keep the instruments well oiled; and the injection of a quantity of sweet oil in the female bladder diminishes the dangers of injury to the vesical mucous membrane.

CHAPTER IX.

PROSTATIC CONCRETIONS—LITHOLAPAXY—USE OF THE CATHETER IN THE TREATMENT OF HYPERTROPHY OF THE PROSTATE—PROSTATIC OBSTRUCTION — PROSTATOTOMY FOR GENERAL HYPERTROPHY OF THE PROSTATE—CANCER OF THE PROSTATE—TUBERCULOSIS OF THE BLADDER AND PROSTATE — RULES FOR TREATMENT OF ENLARGED PROSTATE—THE BAR AT THE NECK OF THE BLADDER.

Prostatic concretions are of two kinds; one is known as a starchy or amyloid, the other as an inorganic concretion.

The starchy bodies are generally found in the follicles of the prostate. They probably result from some perversion of the prostatic fluid; they are called amyloid or starchy concretions because they give the characteristic or blue color with iodine.

Inorganic calculi in the prostate result from the deposit of earthy elements of the fluids secreted by the prostate, and it sometimes happens calculi from urine find lodgment in the prostatic ducts, and develop gradually by concretions of urinary deposits. The starchy concretions frequently exist in the prostate without causing the patient inconvenience. The symptoms which these bodies cause the patient are mainly those characterized by prostatic enlargement. Sometimes a careful bi-manual examination enables the surgeon to detect any inequalities in the structure of the prostate which lead him to the recognition of the growth of the concretion; but, generally the passage of a sound and the detection of a click, due to the presence of earthy salts with the starchy substance, is the only method of positive diagnosis. The removal of the concretions may be accomplished by either the supra-pubic or perineal cystotomy. The amyloid bodies may be scooped out or may be removed with forceps.

LITHOLAPAXY.

This term is used to indicate an operation in which the stone is crushed with a lithotrite and the fragments are washed out of the bladder through large tubes at one sitting. Of one hundred and sixty-eight cases of urinary calculi occurring in England in the practice of a single operator one hundred and sixty-five were treated by litholapaxy. Three were females. The ages ranged from two to ninety years. Sixty-six were boys under 15 years of age. One hundred and sixty-one of the one hundred and sixty-five were completed at a single sitting. The complications in these cases were enlarged prostate, stricture of the urethra, cystitis, disease of the kidneys, dysentery, piles, prolapse of the rectum. No effort was made to treat cystitis, for it generally disappeared spontaneously after removal of the stone. Most of the operations were performed under anæsthesia. Three of the one hundred and sixty-five died. One death was caused by peritonitis; exhaustion and old age (90) caused the next death, and pneumonia carried off the third. Dr. Trayer, who made the above operations, says litholapaxy is almost universally applicable to all cases of vesical calculus. He operated one hundred and fifteen times on children under puberty with perfect success in every case—not a death.

Another writer, Dr. Cunningham, says about 90 per cent. of all cases of vesical calculi are suitable for litholapaxy. "The contra-indications for the crushing operation are: Stone very large, bladder much diseased, presence of vesical tumors, dilated or sacculated bladder, irritable contracted bladder with hypertrophied walls and small urethra." These statements fairly represent the views of the most enthusiastic lithotritists. They use for children a No. 6 lithotrite and have apparently always found the instrument strong enough for its purpose. The Bigelow evacutor is universally recognized as the best device for the purpose of removing fragments of calculi after the lithotrite.

USE OF THE CATHETER IN THE TREATMENT OF HYPERTROPHY OF THE PROSTATE.

There comes a time in treatment of enlarged prostate very often where proper diet, exercise, bathing, local application, and judicious administration of drugs fail to reduce the enlargement, and the patient is slowly but surely getting worse.

The urine is retained too long in the bladder; at least a part of it is because the bladder is unable to contract with sufficient force to drive all the urine past the obstructing prostate. This urine must not be allowed to remain in the bladder. It must be drawn off daily until the bladder has retrieved its power, or the obstructing prostate has ceased to interfere. The instrument selected for this purpose ought to be of the softest rubber, it should be perfectly smooth and should have what is called a velvet eye. Before using it, it should be sterilized in corrosive sublimate solution 1 to 1000. The urethra should be injected with warm sweet or cotton seed oil which has been freshly sterilized by heat. It takes but a few moments to heat the oil and this precaution against infection should never be neglected. Then smear the instrument with an ointment made by rubbing together equal parts of Castile soap and white vaseline, dip it for a moment in boiling water and it is ready for use. This last resort to heat is for the purpose of sterilizing the ointment and lubricating the rubber to the highest degree. Now push the instrument gently into the bladder and draw off the urine. Do this twice or more in the same way per day just as soon as your case of hypertrophy of the prosrate begins to show any great excess of mucus in the urine.

If the antiseptic precautions just mentioned are always observed there will be little danger of the case terminating unfavorably.

When I order a catheter for these cases I also order a couple of medium sized test tubes, spirit lamp and the proper solution of corrosive sublimate. I carefully explain to the patient how he is to use the test tubes and spirit lamp in sterilizing water and oil. The patient quickly learns to plug the end of the tube with cotton after the oil has been boiled in it so that it will not become infected with germs from the air while waiting for it to cool.

It is rarely that a patient is found who is too stupid to learn the essentials of catheterization. But sometimes he is too feeble. Then the nurse must be instructed. These precautions guard against cystitis and diminish the tendency to catheter fever. Since I adopted them my practice has been practically free from urethral chills.

PROSTATIC OBSTRUCTION.

The prostate is so often the subject of disease which changes its relation to the bladder and causes inability to empty that organ perfectly, that all surgeons have studied to devise methods of treatment which would be better than those commonly practiced and which have been handed down to us from the remotest times in the history of our art.

The changes occurring in the prostate are few in number, and we will describe them categorically.

The so-called bar at the neck of the bladder may be mentioned first. The great collections of pathological specimens from the time of John Hunter to the present have all contained examples of prostates presenting the peculiar hypertrophy of the middle lobe which causes the bar or dam at the neck of the bladder. But for every such specimen observed the reader should have in his mind the countless instances of death resulting from simple hypertrophies, specimens of which are rarely found in the museum because the mechanism of their interference with the functions of the bladder is not so easily understood as in the case of the bar.

A uniform general hypertrophy of the prostate in some instances causes the most serious impediment to the flow of urine.

I have found the prostate enlarged to twice its normal size without causing the patient any inconvenience in evacuating his bladder. In other cases I have found moderate hypertrophy causing the patient to rise several times through the night to empty his bladder. There is a nervous influence at work in many of the cases of disease of the prostate which acts to cause the difficulty of urinating without reference to the degree of hypertrophy.

Evidence of this is observed in the suddenness with which some patients are attacked with the symptoms of prostatic hypertrophy after exposure to bad weather, excesses of the table, etc.

The surgical treatment of these difficulties promises great achievements, provided it is resorted to early before the bladder has become sacculated or the kidneys irretrievably impaired.

PROSTATOTOMY FOR GENERAL HYPERTROPHY OF THE PROSTATE.

This operation is indicated in all cases of prostatic obstruction in which the gland can be felt to be enlarged. This can generally be easily done by making a careful bi-manual examination of the organ.

It is a serious but not a dangerous operation, providing the urethra is not opened and urine does not come in contact with the wound.

The patient should be carefully prepared by having the intestinal canal sterilized, by taking sulphur in 10-grain doses once in 4 hours for two days before the operation. When sulphur produces griping or too frequent evacuations, I have found sulphocarbolate of zinc in 5-grain doses once in 3 hours, to render the stools odorless, and act as an excellent intestinal antiseptic. The perineum must be shaved and carefully scrubbed with soap and water, to render it aseptic. Chemical antiseptics, corrosive sublimate 1 to 1000, or carbolic acid, 5 per cent. solution, may be used to wash the field of operation before the section is made. Then a sound, catheter or lithotomy staff should be introduced into the bladder for the purpose of enabling the operator to find the urethra and avoid cutting it. The incision should commence one inch in front of the anus in the middle line of the perineum and should run to the junction of the skin and anal mucous membrane. It should then run past the anus after the manner of the incision in lateral lithotomy. Then a second incision should start from the one already made, and pass along the opposite side of the anus, the two making an incision shaped like an inverted Y. It should include the skin, fascia and superficial muscles of the perineum. The sphincter of the anus should be pushed backward, and the ischio-rectal fossa found on each side entered. Then the prostate is easily exposed and the finger can readily determine its relations to the urethra, bladder and levator ani muscles. A slice can be cut with scissors from either lateral lobe, care being taken not to divide the parts so as to wound the urethra. The capsule of the gland is thus freely divided, and the leverage which the gland gives to the muscle fibers of the neck of the bladder is destroyed. The urine can now, in all probability, be passed without difficulty. The wound should be thoroughly dried, a small drainage tube introduced and the external wound brought together with interrupted sutures and sealed with iodoform collodion. The drainage tube should be removed as soon as the process of repair is fairly under way. The bowels should be kept in a soluble state and assisted to move by injections of sweet oil. The drainage should seek to thoroughly empty the ischio rectal fossa of the serum which in that region may easily become infected by the migration of micro-organisms from the rectum. The patient should be allowed, if he so desires, to stand and evacuate his bladder during convalescence from this operation. If, however, the urine does not flow readily the catheter may be used as before the operation until the parts have healed and muscular soreness disappeared. The patient may then expect marked improvement in his condition.

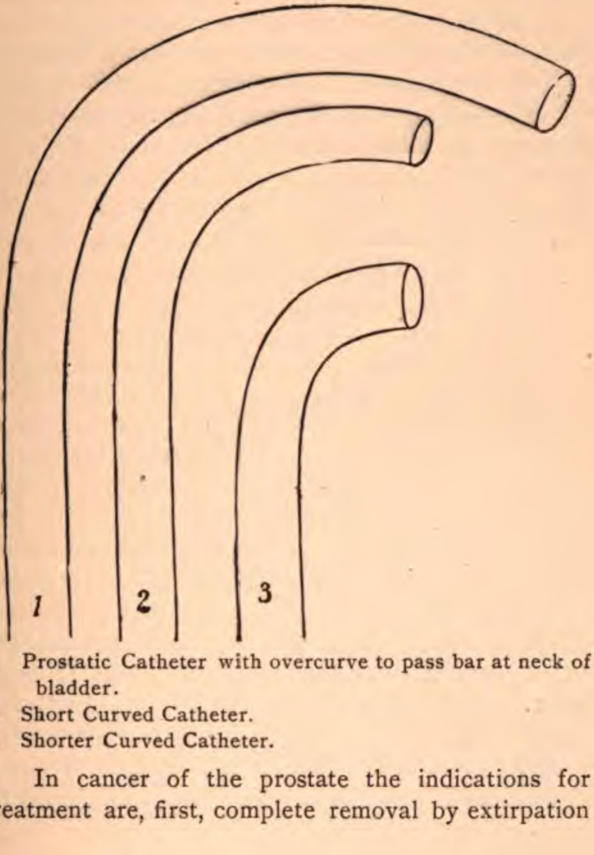
CANCER OF THE PROSTATE.

Cancer of the prostate is not distinguished from cancer in other glandular organs except by its location, and the organs with which it is associated. It is, however, rarely recognized, but it is probably more frequent than is commonly supposed.

The difficulty of distinguishing cancer of the prostate from simple hypertrophy is considerable and it is quite likely that many cases of cancer die with all the symptoms of hypertrophy. Encephaloid is the type which is almost always present. Dr. W. E. Scriber brought a case to me which presented a fairly typical history of cancer of the prostate. He was an old man 70 years of age, thin, weak and cachectic. He began to suffer from frequent nocturnal micturition and loss of sleep, with great pain in the perineum, about one year before he came to me. Dr. Scriber had given him a soft catheter and had prescribed anodyne suppositories with the result of improving him for several weeks.

His symptoms, however, recurred in aggravated form, and his urine became bloody and ammoniacal. Examination with the finger in the rectum revealed the prostate enormously enlarged, its convex surface quite irregular. Catheterism caused him much suffering, was followed by rigors, rise of temperature daily, and loss of appetite. Hæmorrhage was free after the most gentle use of the instrument.

When I examined him, the enlargement of the prostate blocked all the space which could be felt anterior to the rectum with the finger. The perineum bulged prominently and the growth in the prostate could be felt through it. The treatment which I advised and carried out consisted in making an incision through the tumor from the perineum to the bladder and draining that organ so as to avoid the necessity for frequent catheterization. The patient did well and lived comfortably until exhausted by cancer infiltration and cachexia. The perineum remained open. The cancerous prostate was divided and exfoliated freely, but there was no rapidly exhausting discharge and for a time there was marked shrinkage of the tumor.



1. Prostatic Catheter with overcurve to pass bar at neck of bladder.
2. Short Curved Catheter.
3. Shorter Curved Catheter.

In cancer of the prostate the indications for treatment are, first, complete removal by extirpation through the perineum when not so advanced that such a procedure is impracticable, owing to infiltration of adjacent organs and lymphatic glands.

The next place is to obviate the obstruction to the flow of urine which the cancer causes. This may in most cases be done by catheterism. When, however, the catheter adds fever and rigors to the other symptoms a perineal cystotomy should be made for the purpose of draining away the urine. Pain should be relieved by the cautious use of anodynes. The specific treatment of cancer being unknown, all remedies are palliative in their effects.

TUBERCULOSIS OF THE BLADDER AND PROSTATE.

Tuberculosis of the bladder and prostate will commonly be diagnosed by exclusion. The growth of tubercle bacilli in the bladder is very early a cause of cystitis, and the search for the cause of the cystitis in some pre-existing disease of the urethra, prostate or kidney will reveal those organs sound. This fact commonly leads to the diagnosis of vesical tuberculosis, although it occasionally happens that the testicles, *vas deferens* and seminal vesicles are primarily the seat of the disease. If the tubercles infect the neck of the bladder and prostate, the resulting cystitis is likely to be accompanied by more tenesmus than when it involves the fundus of the organ. Treatment of vesicle tuberculosis is, at best, little more than palliative. The ordinary remedies to relieve the pain should be resorted to. Cod-liver oil and peptonized beef should be taken freely. The bladder must be carefully washed out with pure sterilized water first, until mucus and pus are washed away, then peroxide of hydrogen (15 per cent.), diluted one-half with water, should be injected once a day. This should be followed by 10 grains of iodoform suspended in four ounces of tepid water, which should be used to wash out the organ. A quantity of iodoform will be deposited on the tubercular ulcers. The radical treatment of vesical tuberculosis by cystotomy, curetting with sharp spoon and iodiformization, is the only plan of treatment which promises much, and it must be practiced very early before the infection has spread to the ureters and kidneys.

The internal use of benzoate of soda in five-grain doses three times a day, for several days, has sometimes an excellent effect in cystitis resulting from any cause. It has been lauded by some writers as a remedy for tuberculosis. There may be a medicine which, entering the fluids of the human body, will so change them that, without interfering with their normal functions, they will be rendered undesirable places of residence for the bacillus tuberculosis; but that drug has not yet been discovered and applied in the treatment of disease.

ABSCESS OF THE PROSTATE.

This affliction is one which is often entirely

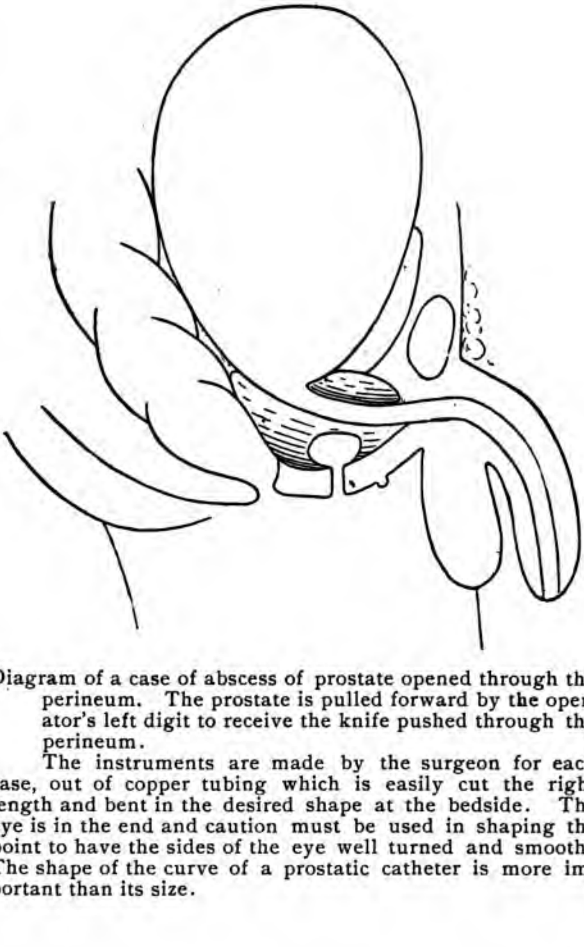


Diagram of a case of abscess of prostate opened through the perineum. The prostate is pulled forward by the operator's left digit to receive the knife pushed through the perineum.

The instruments are made by the surgeon for each case, out of copper tubing which is easily cut the right length and bent in the desired shape at the bedside. The eye is in the end and caution must be used in shaping the point to have the sides of the eye well turned and smooth. The shape of the curve of a prostatic catheter is more important than its size.

overlooked until it manifests itself by a gush of pus from the urethra or rectum, and, rarely, into the cavity of the peritoneum. It may, however, be diagnosed quite readily by the following symptoms. When there is pain and difficulty in micturition and defæcation, which does not subside but rather increases. The patient is restless, feverish, and complains of a feeling of tension and of a throbbing pain in the perineum and at the neck of the bladder. He may also have one or more chills. Bi-manual examination reveals great tenderness of the gland, and a soft, fluctuating feel in place of the hard, firm resistance to the finger so characteristic of the normal prostate. There is often, also, tenderness and fluctuation of the perineum. Satisfied of his diagnosis, the surgeon should proceed to relieve the symptoms by evacuating the cavity. The patient should be anæsthetized, and the surgeon, his left forefinger inserted in the rectum, and pulling the gland forward, should plunge a bistoury into the raphe of the perineum over the point of greatest tenderness. To insure good drainage the knife should be carried to a depth of from one and one-half to two inches. The wound should be treated antiseptically, as any such wound, and the operation will commonly be followed by complete relief.

A CASE.

An old man, aged 70 years, had been suffering for ten days with more or less impediment to the flow of urine, when I was called to see him.

His physician had used the catheter, but found the prostate more painful and swollen than usual, so that the passage of the instrument caused great pain. He had a temperature of 102°; his stools were very painful; his tongue was furred, and his pulse quick. Bi-manual examination revealed a tumor occupying the normal site of the prostate and extending downward into the vesico-rectal space until with a little effort by the finger pushed behind it, it could be made to protrude into the perineum as a distinct prominence. The painful character of the tumor, the peculiar sensation it imparted to my sense of touch, the fever and loss of appetite suffered by the patient led me to diagnose abscess of the prostate. A bistoury was pushed through the center of the perineum in the raphe until its point penetrated freely the contents of the tumor, which were felt to offer less resistance to the advance of the instrument than the other tissue. Then the blade was withdrawn. A free discharge of pus followed, and the patient experienced great relief. The cavity was subsequently washed daily with hydrogen peroxide, the patient given tonics, and the wound healed in three weeks.

RULES FOR TREATMENT OF ENLARGED PROSTATE.

When a patient is just commencing to suffer from incomplete evacuation of his bladder, as manifested by the increased frequency of desire to urinate, the disturbance of sleep and the physical signs of prostatic hypertrophy, a gymnastic training of the levator ani and accelerator urinæ muscles may relieve the symptoms, providing the proper constitutional remedies to secure digestive vigor have been applied. A weak digestive apparatus must be remedied first in all pressing cases of prostatic hypertrophy. This can generally be done by providing for the patient a radical change of diet. Give him nothing that he has been accustomed to eat. If his regular diet is bread, meat and potatoes, give him instead maccaroni, eggs and butter, with tomatoes and bean soup. Then keep his bowels open with a dose of sulphur and magnesia every night. Tell him to always urinate twice. Once when nature prompts the act and a second time by effort of will after walking about for five or ten minutes. The second micturition will after a few trials suffice to empty the bladder of all residual urine. The levator ani and accelerator urinæ are by this method stimulated and trained to grasp the prostate and pull it aside so to speak until the urine has passed.

In this stage a suppository of opium powder, gr. j, and camphor gum, gr. ij, used at night diminishes the reflex excitability of the prostatic muscles and favors the cure. They must always be used with caution that the digestive process and elimination by the skin and bowels be not interfered with. Diluent drinks like barley and flaxseed tea are beneficial. I have seen excellent results follow the internal administration of the following prescriptions:

℞	Fl. ext. buchu	℥ j.
	Soda bi-carb	ʒ j.
	Aqua, q. s	℥ iv.

M. Sig.—Tablespoonful once in three hours.

℞	Fl. ext. pichi	ʒ ii.
	Soda borate	ʒ ss.
	Aqua, q. s	℥ ij.

M. Sig.—Teaspoonful once in three hours.

℞	Benzoate of soda	ʒ i.
	Ext. colocynth	gr. v.

M. Ft. caps. No. xx. Sig.—Take one once in three hours.

The patient should exercise in the open air, if the weather is fair, enough to develop physical fatigue before retiring. I cannot over-urge this feature of the early treatment of prostatic hypertrophy. I believe it is one of the surest ways to get out of the urine those organic substances the result of tissue changes, which when they reach the sensitive bladder and prostate irritate them and provoke the desire to urinate and empty the bladder only partially. A long walk an hour after supper, with an empty bladder, and going to bed physically fatigued have aided greatly the restoration to health.

THE BAR AT THE NECK OF THE BLADDER.

When the surgeon has satisfied himself that his patient is suffering from the presence of a bar at the neck of the bladder, which threatens to become the cause of cystitis, dilated or thickened bladder, or diseased kidney, he should proceed at once to remove the offending portion of the prostate. Success will follow an operation of this kind made early, before the patient is broken in general health.

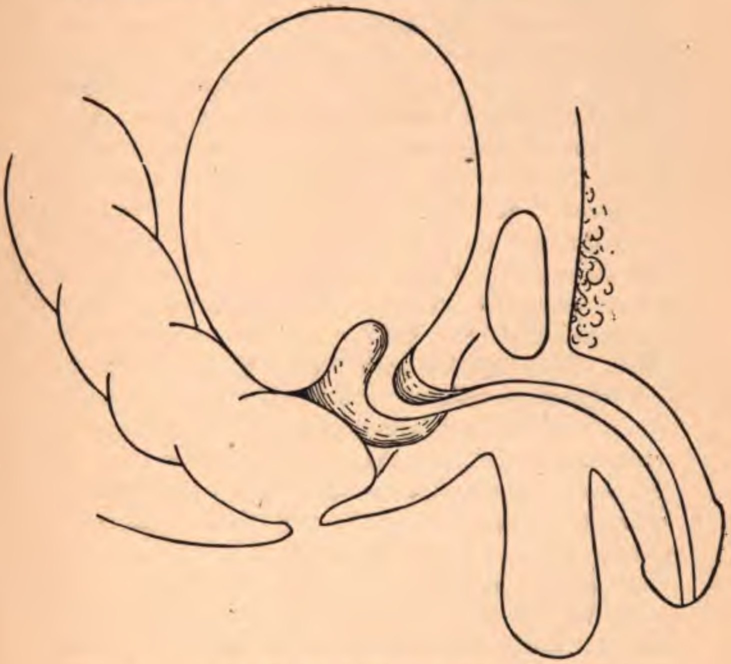


Diagram showing the bar at the neck of the bladder curved by enlarged prostate. The tip of the catheter must hug the anterior wall of the urethra, and its curve must represent a perfect quadrant the radius of which is two inches.

The perineum must be prepared as for the operation of perineal cystotomy. The guide must be introduced through the urethra into the bladder. Then the tissues must be cut through as in the operation for stone in the bladder. The finger should then be passed along the wound into the bladder to search for the obstructing bar. This can generally be found projecting from the neck of the bladder into its cavity. Sometimes it is almost pedunculated in its relations to the prostate. At other times the operator will recognize it as a smooth, rounded surface, projecting very little into the vesical cavity. The size of the bar will determine the kind of instrument to be used in its removal. If it projects sufficiently into the bladder an ecraseur may be used to remove it. The wire or chain can be applied with little difficulty when the bar projects prominently into the bladder. A number of instruments have been devised for the purpose of removing the bar, but they are not better than the ecraseur. However, when the bar is not prominent enough to be grasped in the grip of the ecraseur, a strong forceps may be used to pinch it off, or to pinch out a portion of it, so that it cannot be crowded down upon the urethral orifice. Instruments made especially for this work can be found in the instrument shops. Some of them resemble a lithotrite, and are intended for use without a perineal or supra-pubic cystotomy.

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AUT NUTRIMENTUM AUT NULLUM.

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